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CONTENTS

ORIGINAL ARTICLES.

Some Recent Bronchoscopic and Esophageal Cases. Richard H. Johnston, Baltimore, Md. 49
History of Bronchoscopy—Statistics—The Straight Position—Cases of Unusual Interest.

Experiences in Esophagoscopy. Sidney Yankauer, New York 53
The Possible Dangers of Esophagoscopy—The Removal of Foreign Bodies—Diagnosis of Diseases of the Esophagus—Important Points for Consideration—Report of a Case.

The Artificial Restoration of Lost or Missing Tissues in Congenital Cleft Palate—A New Device. Vethake E. Mitchell, New York 57
The New Principle Involved—The Tissues Affected and Their Function—What the Appliance Does—Improvements Accomplished—Case Reports.

Foci of Infection in the Ear, Nose and Throat. Frank Albert Burton, San Diego, Calif. .....
Connection Between Mouth Infection and Constitutional Diseases—The Most Common Constitutional Symptom—A Case—Rosenow's Investigations—Tonsillotomy vs. Tonsillectomy—Tonsillar Infections—Case Histories—Conclusions—Bibliography.

Vertigo: Its Causes and Methods of Diagnosis. Lewis Fisher, Philadelphia, Pa. 67
The Static Sense—What Is Vertigo?—The Ear and Vertigo—Experimental Vertigo—Vertigo Caused by Disease—Conditions Causing Vertigo—Conclusions.

Deflections of The Nasal Septum. I. A. Lederman, Louisville, Ky....71
Causative Factors — Trauma — Increased Cranial Development — Anatomic Conditions — High-arched Palate — Excessive Turbinal Development—Types of Deviations—Effects of the Deviation—Submucous Resection—Indications for Operative Intervention—References.

Septal Hemorrhage; Its Cure by Submucous Elevation. John Leshure, New York 75
The Steps of This Procedure—Indications for Operating—Technic of Operation—Summary.

An Inflatable Rubber Bag for Intranasal Use. August L. Beck, New Rochelle, N. Y. 77
Description—Uses—Splint—Ease of Insertion—Ease of Removal—Hemorrhage Control.

Tuberculous Mastoiditis: Radical Operation Under Cocain Anesthesia. Harold Hays, New York City..79
History of the Case—Method of Anesthesia—Operation—Practical Deductions.

Notes on the Surgery of Foreign Bodies in the Interior of the Eye. J. Herbert Claiborne, New York.80
Three Illustrative Cases—Their Histories—Methods of Treatment—End Results—The Magnet—Location of the Foreign Body—The Author's Conclusions.

The Operative Treatment of Strabismus. Herbert Wright Wootton, New York City 85
Non-Paralytic Strabismus—Choice of Operation — Advancement and Tenotomy — When Are They Indicated.

Difficulties in the Diagnosis of Monocular Optic Neuritis. Jesse S. Wyler, Cincinnati, O. 87
The Constitutional Causes—The Local—The Focal Infections—The Sinuses and the Teeth—A Case in Point.

Specific Epipephycitis (Trachoma). J. H. Simpson, Louisville, Ky. ..88
Facts Regarding the Nomenclature—Statistical Remarks—The Causative Agent—Etiologic Information—Therapeutic Measures — Surgical Treatment — Radiotherapy —References.

A Piece of Lead Pencil in the Orbit One Year: A Case Report. Joseph Bruder, New York City 93
History of the Case—Operation—Result.

EDITORIALS.

The Significance of Cough of Sudden Onset 94

Surgical Suggestions 95

BOOK REVIEWS.

Diseases of Occupation and Vocational Hygiene. Kober and Hanson. Preventive Medicine and Hygiene—Rosenau 95

PROGRESS IN SURGERY.

A RÉSUMÉ OF RECENT LITERATURE.

Relations of the Cavernous Sinus to Other Structures. Acute Infection of the Throat. Esophagotracheal Fistula. Vasomotor Disturbances of the Upper Air Passages. Adenoma of the Palate. Tracheotomy Tube in the Lung 96

MISCELLANY.

Glossectomy and Laryngectomy...70

Tonsillectomy for Arthritis 80

The Selection of Surgeons by the Hospital 93

The New Ophthalmological Service at Bellevue Hospital 93

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VOL. XXXI. MARCH, 1917. No. 3.

SOME RECENT BRONCHOSCOPIC AND ESOPHAGEAL CASES.*

RICHARD H. JOHNSTON, M. D., F. A. C. S.,
BALTIMORE.

Nineteen years have passed since Killian demonstrated that a foreign body could be safely removed from a bronchus through a tube introduced between the vocal cords. It is interesting to trace the growth of bronchoscopy since that time. At the end of 1897 only five cases of successful foreign body extraction had been reported. Up to 1901 the number had reached 19; in 1904, 36; in 1906, 137; in 1907, 165; in 1909, 394; and in 1911, 595. I have not been able to get statistics for the last five years but it is safe to assume that successful extractions now number considerably more than a thousand. Killian's demonstration must be regarded as one of the great epochs in surgery for it has been the means of saving many lives. To prove this I must ask attention to the statistics of foreign bodies before the introduction of the bronchoscope. Weist, in the study of 1,000 cases, advised that, unless dangerous symptoms supervened, foreign bodies impacted in the trachea or bronchi should not be operated upon and that the surgeon should wait for spontaneous expulsion which occurred by coughing up, according to statistics of Preobraschski and Pohl, in 218 cases out of 1,064—i. e. 20.5 per cent. According to Tuffier, up to 1897, out of 11 cases of pneumonia due to foreign bodies, the supposed foreign body was on 10 occasions not discovered; in 4 of these cases operations resulted in death. Kerewsky in 1903, out of 14 cases of thoracotomy for foreign bodies, could point to only two successes.

The mortality from inhaled foreign bodies was formerly large. Among untreated cases more than 770 deaths were reported—52 per cent. As this number refers only to acute cases and does not include patients dying from lung complications due to the presence of foreign bodies, the mortality must be increased considerably.

Now let us compare these figures with the bronchoscopic period from 1900 to the beginning of 1909. Though in the early days of bronchosopy, instruments were imperfect and operators not skilled, Von Eicken shows in a series of 300 cases a very important decrease of mortality as compared with former times—13.1 per cent as against 52 per cent. For 1909 and 1910 statistics collected by Kahler showed 291 cases with 27 fatalities—9.6 per cent. The extraction of the foreign body was successful in all except 11 per cent of cases. Not a single death among the 27 could be attributed to the method itself. Among the 291 cases there were only 4.5 per cent of failures. It must be said that among the 27 fatalities, were patients who died from the effects of the long duration of the foreign body after the object itself had been extracted. No better argument of the value of bronchoscopy could be advanced than a study of the above statistics. With these preliminary remarks I come now to the real object of this paper which is a description of certain methods of examination which tend to simplify direct laryngoscopy, bronchoscopy and esophagoscopy. The mere recital of foreign bodies removed from the bronchi and esophagus is no longer of special interest to the laryngologist. What is needed is the simplification of instruments and methods of examination which will enable all throat specialists to work successfully in these regions.

The cases which I shall report will be used to illustrate certain methods of holding the patient's head and of passing instruments which will make direct laryngoscopy, bronchoscopy and esophagoscopy so easy that any laryngologist with a few weeks practice can use them successfully.

For a number of years after Killian's demonstration, the only method of holding the patient's head for passing straight tubes was almost complete extension in the sitting or the supine position. In Jackson's book on Tracheo-Bronchoscopy, published in 1906, one is struck with the extended position of the head recommended for direct laryngoscopy. In 1908 Mosher introduced his "left, lateral route" which consisted in turning the patient's head until the left cheek almost touched the plane of the table and flexing the head on the chest. The operator sat at the left of the table and introduced the special spatula between the left bicuspid teeth. The tongue was pushed to the side and the epiglottis lifted, exposing the larynx. By pushing the spatula further down the upper end of the esophagus was

*Read by invitation before the Laryngological Section on Laryngology, New York Academy of Medicine, November 16, 1915.

opened, giving a good view to the clavicle. The method was used under general anesthesia and was difficult to learn so it never became popular.

In July of the same year, I tried exposing the larynx wiith the head on the table slightly flexed but straight. I afterwards modified the position of the head so that it lay straight on the table without flexion or extension. In extension the head is always brought over the end of the table and a special assistant holds it in proper position for successful work. In the Boyce position, used by Jackson, the head and shoulders are brought over the end of the table which must be high if the operator is not to occupy a cramped position on a low stool. The straight position with the head on the table has been so satisfactory that since 1908 I have used no other in direct laryngoscopy, in passing the bronchoscope in older children and in adults, in examining the upper end of the esophagus and even in the removal of certain bodies in the esophagus and trachea.

When the method was first introduced, some laryngologists claimed that it was not possible to see around a curve with a straight tube; the answer is that in children's throats the tissues are yielding and the right angle formed by the mouth and throat can be easily made straight by manipulating the laryngoscope. In bronchoscopy and esophagoscopy extension of the head was always used until it was demonstrated that the straight position was simpler for passing the bronchoscope and for examining the upper end of the esophagus in older children and adults. In the cases to be reported I shall show that, under certain conditions, the entire trachea and esophagus can be examined with the patient's head straight on the table.

After my success with the straight position in direct laryngoscopy, it occurred to me that by elevating the patient's body and head the bronchoscope could be passed with the head straight; then, if necessary, the pillow supporting the head could be removed and the head allowed to drop to the plane of the table so that the bronchoscope could be passed without dropping the head over the end of the table thus doing away with the necessity of having an assistant to hold the head in a certain position. The first experiments with straight bronchoscopy worked well and for five years I have used no other method of passing the bronchoscope in adults and older children. The method is simpler than bronchoscopy in extension and possesses the advantage that trained assistants are not needed. The head of the patient does not leave the table. In straight bronchoscopy the operator either stands at the left or sits at the head of the table. The anesthetist controls the movements of the head. In young children the straight position is used without anesthesia of any kind. I have explained the positions at length and have compared them with extension because I shall refer to them exclusively in the case reports.

The first patient was a little girl, 23 months old, from a town in Pennsylvania, referred to my by Dr. S. Demarco with the history of having aspirated a watermelon seed. Two days before I saw her, while eating watermelon, her mother observed that she suddenly choked and had a paroxysm of coughing during which she became cyanotic. After the paroxysm she quieted down but coughed occasionally; she seemed to have some difficulty in breathing. The temperature was elevated and pulse accelerated. Examination of the chest revealed a flapping sound in the trachea which seemed to indicate that the foreign body was moving with inspiration and expiration. The patient was taken to the University Hospital and preparations were made to remove the seed. The method of operation will be described in detail because, so far as I know, it is the first time that a foreign body has been removed from the trachea with the head straight on the table. The child was wrapped securely and pinned in a sheet so that her arms and legs were practically immovable. She was then placed on the table in such a manner that the head reached to but did not extend over the end of the table. The head lay flat on the table without a pillow. An assistant steadied the head while a nurse attended to the arms and legs. Standing at the left of the table I passed my modification of Jackson's child speculum between the incisor teeth, pushed the tongue out of the way and exposed the larynx. The seed could be seen moving up and down with expiration and inspiration. I now passed Pfau's forceps between the vocal cords, seized the seed and removed it in a few seconds. The trachea to the bifurcation lay before us. No anesthetic was used. The little patient left the table unhurt and was taken home the same afternoon. I had never attempted the removal of a foreign body from the trachea with the head straight before. From this experience I believe that all flat foreign bodies too large to enter a bronchus can be removed from the trachea more quickly than with the head extended. In this case I am sure the seed was removed in less time than it would have taken to get the head in proper position for extension. It is a difficult thing to hold the head of a struggling child over the end of the table as I know from personal experience. But with the plane of the table as a point of support anyone can hold a child's head almost still.

The next case is one of unusual interest. In July, 1914 I was asked by Dr. S. K. Merrick to see M. C., 6 years old, with a history of hoarseness of ten months duration. The child was well nourished and seemed in good health except for a cough and hoarseness. There was no difficulty in breathing. The family physician had seen her in September, 1913 in the beginning of her illness and had been unable to find any cause for her symptoms. The patient had enlarged tonsils and adenoids and these were removed in the hope of curing her throat. The symptoms persisted and in March, 1914 she was taken to a specialist who was unable to see the larynx with a mirror. He thought multiple papillomata were causing the hoarseness and instituted treatment accordingly. There was no improvement and in July I was asked to examine the patient with the direct laryngoscope. As is my custom with children under 8 years old, I decided to make the examination without anesthesia of any kind. The girl was wrapped and pinned in a sheet and placed on the table with head straight and held in position by an assistant. Standing at the left of the table I passed my modified Jackson laryngoscope and exposed the larynx. In the subglottic space, partly in the larynx and partly in the trachea, there was a grayish object, undoubtedly a foreign body. I should say in passing that as we entered the operating room, the father recalled that in September, 1913, the patient had swallowed an open safety pin. There could be no doubt that the pin was in the wind-pipe. The foreign body looked so inviting that I was tempted to try removal at once. I introduced Pfau's forceps and caught hold of the pin point which was up. It was my intention to draw the pin up in the laryngoscope and to coax the body out as I had done on a previous occasion with an open safety pin in the esophagus. Unfortunately the object was encrusted with salts from its long sojourn in the body and so weakened that when I grasped the pin it snapped off and the body disappeared. To my chagrin the forceps brought out one-half of the pin. I decided to do nothing further at that sitting but to rely on an x-ray picture to locate the pin which proved to be in the left bronchial tube in the seventh intercostal space. A few days later I passed the Jackson 5mm. bronchoscope and located the head of the pin. It was my intention to grasp the pin itself because of the possible danger of penetration of the bronchical wall by pulling on the head. Unfortunately I could not see the pin. By this time the bronchus was filled with blood and mucus so I was forced to give up the examination. One week later the pin had passed down to the eighth intercostal space. Another attempt at removal failed. Each time chloroform was used as the anesthetic. The pin now passed rapidly downwards; two more attemps at removal were unsuccessful. I now decided to perform tracheotomy and to pass the short 5 mm. tube through the wound in a final attempt at removal. The patient stood the operation well and at the end of a week was ready for the final ordeal. Under chloroform anesthesia Jackson's 5 mm. tracheoscope was passed through the tracheal wound into the left bronchial tube. To my amazement no trace of the pin could be seen though the terminal bronchi came into view. While still asleep the patient was subjected to another *x*-ray picture which showed the pin in the ninth interspace. I passed the tracheoscope the second time and carefully examined all the terminal bronchi. One of the anterior branches was closed by swelling of the membrane at the opening. I devoted my attention to this particular bronchus and requested the anesthetist to allow the patient to wake sufficiently to cough which I knew would open the bronchus temporarily. When the cough came the bronchus opened and I saw the head of the pin. I now passed forceps through the tube and used them as a dilator to push the swollen membrane aside. It was then comparatively easy to grasp the head of the pin and to remove tube, forceps and pin together. The patient had some reaction but was well enough to go home at the end of the week. She has since remained well. When the pin was removed it was placed on the table. When I picked it up a moment later the pin broke off close to the spiral. We were thankful that this happened outside of the trachea for if it had broken during removal it would have passed down into the lung and caused the death of the patient. This case is interesting for several reasons. First, the long sojourn of the pin in the body which caused it to become brittle, increased the danger of removal and prevented my getting it at the first operation. I was afraid to pull on the head for fear of puncturing the bronchial wall. For this reason I was anxious to grasp the broken pin: I was unable to do so because I could not see it. Second, the rapidity with which the pin traveled down was unusual because the left bronchus in a child of six years is small and it seemed impossible for an open safety pin to pass into a terminal bronchus. Third, the attempt to remove the pin from the subglottic space without a general anesthetic was bad judgment. I believe, however, that the attempt would have been successful if the pin had not been brittle. This case illustrates the difficulties with which one is liable to meet in tube work aand proves that success in this branch of surgery depends not

upon fixed rules but upon the ingenuity of the operator.

The third case illustrates straight direct esophagoscopy. Since 1908 I have used the straight method for diagnosing diseased conditions and removing foreign bodies from the upper end of the esophagus in children without anesthesia. The position of the head and the instrument are the same as for direct laryngoscopy and the examination is as easily made. In adults under general anesthesia the laryngoscope is passed with the head straight on the table. If, however, the entire esophagus is to be examined, I have heretofore dropped the head to the plane of the table and passed the esophagoscope in extension. In the case to be reported a foreign body was removed from below the clavicle with the head straight. I believe the straight method will work with all flat objects for the reason that they practically always lie in the posterior plane of the esophagus and the esophagoscope passed with the head in extension is liable to slip over or above the object with the result that it is found with difficulty and after prolonged search. With the head straight all muscles are relaxed and the posterior wall of the esophagus is in clear view. The patient was a woman, 26 years old, who, while chewing her food, had the misfortune to break her hard, rubber tooth plate into three pieces. The central, suction part disappeared down her throat. She consulted a physician who made light of the accident and advised a dose of castor oil. The next morning difficulty in swallowing induced her to see her family physician who told her of the seriousness of the trouble and advised an *x*-ray picture. She did not accept the advice but decided to wait a day or two. Two days later pain and temperature developed. She then had a picture made which showed the plate in the esophagus below the clavicle. The accident happened Sunday morning; Thursday afternoon under ether anesthesia I examined the upper end of the esophagus and then passed the esophagoscope with the head in extension with the result that I missed the foreign body. The next afternoon the patient was again etherized. I then proceeded to examine her as follows: The head was held straight on the table. Jackson's large separable speculum was used to expose the upper end of the esophagus. The 7 mm. bronchoscope which has a pointed end was passed through the speculum and easily slipped into the esophagus. I now found that posterior esophageal wall was in plain view and I had no difficulty in locating the plate which was in the posterior plane of the esophagus. As an experiment I passed the esophagoscope over the plate and examined the esophagus as far down as the tube would go without extending the head. With forceps introduced through the bronchoscope I seized the plate and gradually coaxed it out. The patient left the hospital the next day.

The next case illustrates the danger of putting things in the mouth. A boy, 9 years old, placed a .32 caliber empty cartridge shell in his mouth and when his teacher spoke to him swallowed it with the result that he nearly choked. He became cyanotic and had a severe coughing spell. After a time he quieted down but was so weak he had to be taken home. He continued to cough and soon developed a high temperature. His breathing was interfered with. The parents not realizing the seriousness of the case did not call in a physician until 48 hours later. He advised immediate removal to the University Hospital. When I saw the patient his temperature was 104 degrees, pulse 140 and respiration rapid and labored. The respiratory murmur on the right side was diminished. An *x*-ray picture showed the shell in the right bronchus with the open end up. At 8.30 o'clock that evening the boy was placed on the table with head and body elevated on pillows. He was etherized and the 7 mm. bronchoscope passed with the head straight. The pillow under the head was then removed. The bronchoscope was quickly passed into the right bronchus with the exposure of the foreign body. Forceps introduced through the tube grasped the shell but repeatedly slipped off. Finally a good hold was secured and shell, forceps and tube pulled out together. Just as the larynx was reached the foreign body was lost aand the boy became cyanotic and stopped breathing. It looked as if his trachea would have to be opened but a finger on the larynx pushed the shell down after which breathing was quickly restored. The bronchoscope was again passed and the shell found in its original position. The forceps again slipped and it was some time before a hold was secured and the foreign body removed. The next morning the boy's temperature was 99 degrees and pulse and respiration were lower. From this time recovery was uneventful.

In January, 1915 W. J., 16 years old, was referred to me by Dr. John Dunn of Richmond. His trouble was dyspnea which had grown progressively worse for ten months. Dr. Dunn had diagnosed a tumor of the trachea with the mirror. There was no difficulty in seeing a white mass at about the sixth tracheael ring with the mirror. The 7 mm. bronchoscope was passed under local anesthesia with the patient sitting and the tumor examined. It was irregular in shape and took up about half the space in the trachea. Forceps were introduced and the tumor removed as well as possible. After the

operation no remains of the growth could be seen. Alcohol was applied to the wounded surface. The boy was kept in the hospital a month and repeatedly examined but no recurrence was seen. He was then allowed to go home apparently cured. There has been no recurrence. Pathological examination showed a papilloma.

Recently I have had another opportunity to use straight bronchoscopy and esophagoscopy. The patient was a female, 62 years old, with a short thick neck. Such subjects are considered difficult for any form of tube instrumentation. Because the patient was nervous and because of the extensive examination to be made for diagnostic purposes, it was thought better to administer ether. After anesthetization I passed the large Jackson laryngoscope and quickly exposed the larynx which was normal. I then passed the 9 mm. bronchoscope through the short tube between the vocal cords into the trachea. With an assistant holding the bronchoscope, I removed the laryngoscope and pushed the long tube into the right bronchus exposing the terminal bronchi. All the time the head lay straight on the table; the exposure of larynx, trachea and bronchus was perfect and more easily performed than with the head extended over the end of the table. From this experience with two patients I believe it is possible to do bronchoscopy under general anesthesia in some adults and older children with the head straight. The next step was the exposure of the upper end of the esophagus which was done by pushing the large laryngeal speculum down behind the larynx and lifting it. The esophagus opened up for at least an inch and a half and one could study it at leisure. The 7 mm. bronchoscope which has a projecting end was now pushed through the laryngoscope into the esophagus under the guidance of the eye. The walls of the esophagus were examined as the tube was pushed down. With surprising ease the tube passed down as far as it would go. A 10 mm. tube would have worked equally as well. Both esophageal examinations were made with the head straight on the table; larynx, trachea, bronchus and esophagus were seen by the doctors and nurses present. I feel now that straight bronchoscopy and esophagoscopy can be used successfully in many patients in whom formerly extension of the head over the end of the table would have been considered a necessity.

The last patient upon whom straight esophagoscopy was used successfully was a woman, 25 years old, who, while eating soup, swallowed a bone which the *x*-ray located in the esophagus two inches below the clavicle. Under ether anesthesia with the head straight on the table, I exposed the upper end of the esophagus with the Jackson, large, separable speculum. I then passed the 9mm. esophagoscope through the speculum into the esophagus. The bone was promptly located and shown to doctors and nurses present. It was seized with forceps and drawn up with the esophagoscope. At the upper end of the esophagus it slipped from the forceps and was lost and the most careful search did not reveal it. I decided to have another *x*-ray picture made and to go after the foreign body again the next day. Two hours later the patient was nauseated and, during an attack of vomiting, the bone came up. In this case the ease of examining the esophagus with the head straight on the table was again demonstrated. The fact that the patient had large teeth was no disadvantage in passing the esophagoscope and exposing the bone. In three successive cases under general anesthesia straight direct esophagoscopy has worked admirably.

807 NORTH CHARLES STREET.

EXPERIENCES IN ESOPHAGOSCOPY.*

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To attempt to review in a short article the subject of esophagoscopy in all its phases would be an impossible task. I shall therefore limit myself to a consideration of some of the experiences I have had in the use of the direct esophagoscope which are of special interest and importance to the general practitioner.

The question has often been asked whether an esophagoscopy is a dangerous procedure. Now, it could be said that the passage of a straight tube into the esophagus and down its entire length as far as the cardia is not in itself a dangerous procedure; not a single drop of blood is lost, nor is any injury of any kind sustained by the patient. But, in making the statement, I assume that the esophagoscopist is one who is thoroughly familiar with the anatomy of the throat and the esophagus, and is accustomed to handling these parts in the living; and, that he possesses the keen insight, the steady hand, and the manual dexterity which constitutes what is termed technical skill. And, I can also say that the art of direct esophagoscopy has been brought to such a degree of perfection that many accidents that formerly occurred need no longer be feared. But, on the other hand, esophagoscopy is always performed with some definite object in view, and the dangers which are often ascribed to this manipulation are due to the nature of the case

*Read before the Metropolitan Medical Society, December, 1916.

and the character of the operative procedures which must be performed with its aid. Under these circumstances an esophagoscopy may, in individual instances, be a very dangerous procedure.

In an infant, with a smooth foreign body like a coin, recently swallowed, no anesthetic at all need be used. In adults, local anesthesia usually suffices. When the foreign body is a difficult one to remove, like an open safety pin, or if it has ulcerated the wall of the passage, or is buried in a mass of granulation or scar tissue, a general anesthetic may be needed.

For ordinary diagnostic or therapeutic purposes, local anesthesia of the pharynx suffices. But if the patient is restless and intolerant of the manipulations, the use of morphine in full doses, one-half hour previous to the operation, is advisable. Only in exceptional cases is a general anesthetic needed.

Esophagoscopy is performed for the following purposes: (1) The removal of impacted foreign bodies; (2) The diagnosis of disease of the esophagus, in which is included the removal of specimens for microscopic examination; (3) The treatment of esophageal disease.

The Removal of Foreign Bodies:

In considering this question, I wish first to call attention to the fact that among the laity, at least among the ignorant laity, the difference between swallowing and inhaling a foreign body is not understood, and they should be instructed on this point. In obtaining the history of such cases it is of the utmost importance that a clear distinction should be made. Not only the laity, but the physician himself, may not be clear in his statement of the facts. An incident illustrating such an error occurred recently when a physician brought a child to me with the statement that the child had swallowed a chicken bone, and that he had felt it in the esophagus with his finger. I performed an esophagoscopy, but failed to find the foreign body. I instructed the doctor to watch the child, and if it developed a cough we would look for the foreign body in the lungs. A few days later I removed the chicken bone from the right bronchus.

Other errors might be mentioned, for instance: an adult stated that he had swallowed a piece of bone while eating beef-stew; he said that the bone, when it became lodged in the throat, made him retch and vomit so that he dropped his plate of false teeth into the toilet seat. What really happened to him was that he broke his plate in two, that he dropped one-half of it into the toilet seat and swallowed the other half. On the other hand, a careful investigation of even a questionable story of this kind will occasionally bear fruit. For instance: a child was left by its nurse for a few moments; when the nurse returned she found the child had pulled off its stocking and the safety pin with which this was fastened had disappeared. A careful search failed to reveal the safety pin. The child was apparently in good condition and took its bottle without difficulty. Nevertheless, the mother consulted a physician, who fluoroscoped the child and found the safety pin lodged open, with its point directed upwards, in the upper part of the esophagus. When a story of this kind is disregarded the result may be most unfortunate.

A few years ago a patient was brought to the Mt. Sinai Hospital, on the service of Dr. Emil Mayer, in a moribund condition from starvation, with a history of having swallowed some months previously a piece of lead to which a long wire was attached. Although I succeeded in cutting the wire and removing the foreign body, the patient nevertheless died within twenty-four hours. Another child was brought to the hospital last summer because it was vomiting blood. He had been coughing for four weeks. The presence of a foreign body, a collar button, in the neighborhood of the aortic arch, was disclosed by the *x*-ray. In my absence, my adjunct, Dr. Kaempfer, attempted to remove this foreign body, but the condition of the child became so bad during the manipulation that he was compelled to desist. Fortunately for him he was wise enough to desist, for the child died that night, and when I passed the esophagoscope upon the body the next day, I found the following condition: At the level of the aortic arch there were numerous blood clots in the esophagus and upon removing these a perforation of the esophageal wall was found. The esophagoscope was passed through the perforation and into a cavity from which numerous blood clots, two to three inches long, were extracted, and from which quantities of serum escaped through the esophagoscope. When the body was turned upside down the blood and serum poured out in a stream. While removing the clots the forceps came in contact with the foreign body which was then extracted. It was possible to pass an instrument into this cavity almost to the diaphragm.

Under any and all circumstances the removal of a foreign body at as early a date as possible is an important necessity. If the foreign body is smooth and round, like a coin, and particularly when it is lodged in the upper part of a child's esophagus, its removal is accomplished in a few seconds without anesthesia, and without risk to the child. But a foreign body which has been impacted, which has

ulcerated into the walls of the esophagus, and which is surrounded by granulation tissue, may require several attempts and complicated manipulations which, owing to the inflamed condition of the esophagus, becomes very dangerous and under these conditions, it is my opinion that the esophagoscopy should be done under general anesthesia. As a rule, a foreign body which is lodged in the esophagus can be found without difficulty, but even here we may fail. A large, white pearl button which could be distinctly seen in the radiograph near the cardia was not found at the first attempt to remove it, but was removed in a few minutes at the second attempt; while a case of special interest is that of a woman who consulted me because she had swallowed a piece of bone which I found had lodged in the posterior wall of the esophagus just behind the cricoid cartilage. It was readily removed, but the patient returned a few days later stating that the bone was still there and, upon examination, a second piece of bone was found in the right pyriform fossa, which seemed to be a very small piece, but upon grasping it with the forceps a piece of bone 1½ cms. long was extracted from a wound in the mucous membrane.

The Diagnosis of Diseases of the Esophagus:

The extraction of foreign bodies is only one of the uses to which the esophagoscope may be profitably applied. As indicated by the few cases above recited, it is occasionally necessary to pass the esophagoscope to make the diagnosis of the presence of a foreign body, and in the same manner various diseases of the esophagus not only can be recognized with the aid of the esophagoscope, but this instrument enables us to make the diagnosis with a degree of accuracy which no other method affords, and to study the detailed conditions of the diseased process in a manner which cannot be studied in any other way. The most important disease in which the use of the esophagoscope is necessary to place the diagnosis beyond doubt is carcinoma, for it is only by microscopic examination of specimens removed from the growth that a diagnosis can be established with certainty. Sarcoma, lues, and tuberculosis of the esophagus will give a clinical picture which is not always easy to distinguish from carcinoma, and even stricture of spasmodic origin may simulate carcinoma so closely that an experienced surgeon may be led into error. In a case which came under my observation recently thoracotomy had been performed only to reveal a perfectly normal esophagus. In this case a stricture, due entirely to spasm, without any disease of the esophagus, either in the neighborhood of the stricture or elsewhere throughout its lumen, was found. The obstruction was in the neighborhood of the aortic arch. The spasm was so powerful as to prevent the passage of the esophagoscope under local anesthesia, except with the aid of complicated manipulations, but when the patient was esophagoscoped under general anesthesia, no sign of the stricture could be seen.

The importance and value of the esophagoscope, even when the diagnosis seems evident by ordinary methods, is further illustrated by the following case: A woman of forty-six who had been an invalid for many years and who was in an extremely neurotic condition when I saw her, had complained for two years of pain in her throat and difficulty in swallowing. She felt a lump in the throat which moved up and down, and which was regarded as a globus hystericus. She stated that she was unable to swallow solid food, but could swallow liquids, but her husband declared and the patient admitted that this difficulty in swallowing was not continuous, but that at times when her attention was called away from her throat, she was able to eat and swallow any kind of food. She had been treated by various laryngologists who made applications to her pharynx and larynx, but the patient declared that she was worse after each treatment. She was one of those exceedingly nervous individuals who, when you approach them with a tongue depressor, immediately have spasmodic contractions and contortions of the lips, cheeks, tongue and pharynx, and in whom an ordinary inspection of the pharynx is attended with insuperable difficulties. There was no doubt in the mind of her physician that the woman was hysterical and nothing more; she made the same impression upon me and upon all who saw her. Yet, she was so persistent in her complaints regarding her throat that we decided upon an esophagoscopic examination under general anesthesia in order to determine definitely whether the woman had any reason for complaint. Upon raising the cricoid cartilage with the esophagoscope I was greatly surprised to find a well-developed cauliflower growth which had the macroscopic appearance of a carcinoma, and which proved upon microscopic examination of the specimen to be such.

Strictures of the esophagus affords an interesting series of cases for esophagoscopic diagnosis. In strictures resulting from the ingestion of caustics the location, direction and position of the scar, and the direction of the passage through them can be determined with accuracy only upon esophagoscopic examination. The dilatation of tight strictures by the blind method is attended with numerous dangers, but when dilatation by means of fili-

form bougies or mechanical dilators is performed through the esophagoscope, the operations are attended by practically no risk. Neither radiograph nor blind bougie can differentiate with accuracy the character of the esophageal obstruction; for these methods can tell us only in a general way the size and shape of the passage, but when the stricture is tight and only a smooth filiform can be passed, if any can be passed at all, the use of force by the blind method is unjustifiable. With the esophagoscope, however, the stricture can be seen and felt, and the possibility of treatment determined.

This is well illustrated in a case which came under my observation about a year and a half ago of a woman who for three years had difficulty in swallowing. There was a syphilitic history. An attempt to pass the esophagoscope met with obstruction just at the level of the cricoid cartilage. A small lumen a few millimeters in diameter was found on one side. The obstruction was caused by an adhesion of the cricoid cartilage to the posterior pharyngeal wall, forming a web-shaped stricture. I found that by means of a suitable instrument the adhesion could be broken down, and when the lumen was made large enough for the esophagoscope to pass, the tube itself was used to complete the separation. There was no other obstruction and immediately thereafter the patient was able to swallow all kinds of food. Following this we began the passage of a large-sized esophageal bougie, about one inch in diameter, No. 43, and this has been passed at intervals ever since. The patient has had no further trouble from her obstruction.

Cancer of the esophagus presents a very variable appearance, sometimes assuming the form of an ulceration with thickened edges, at other times the appearance of a polypoid or cauliflower growth. It is practically impossible to differentiate carcinoma from sarcoma, or even from some forms of tubercular or syphilitic ulceration by the gross appearance alone. But the removal of specimens for microscopic examination, when carefully performed, is neither dangerous nor harmful. Examination of patients with carcinoma by this method is not dangerous, provided the patient is tolerant and permits the passage of the instrument without undue resistance or restlessness. If the patient is not tolerant, the administration of morphine in full doses an hour or so before the operation will be of material assistance, but if with the aid of cocaine and morphine the patient does not permit the examination to be made, it is wiser to desist and to place the patient under general anesthesia.

When a pronounced lesion of the esophagus is seen through the esophagoscope, *it should be an invariable rule not to make any attempt to pass any instrument beyond the growth.* Specimens can often be removed while the end of the tube is still a few centimeters *above the growth itself.* As long as the tube remains in contact with normal mucous membrane only and the patient is quiet, there is no danger of serious injury. But the portion of the esophagus occupied by an ulceration or a new growth is apt to be very fragile, and any attempt at instrumentation is likely to lead to serious consequences. Little can be gained by such attempts. *It should also be a rule in passing the tube for diagnostic purposes never to use an obturator or a mandrin for the introduction, but this should be carried out under direct vision.* In this way the presence of a lesion can always be determined before the instrument itself has come in contact with it.

It is not difficult to recognize the various lesions that may be seen within the esophagus such as ulcerations, patches of dilated veins, etc. As an illustration of the accuracy with which alterations in the mucous membrane may be recognized, I shall quote the case of a patient who had complained of pain and swelling in the neighborhood of the sternal notch. Examination with the esophagoscope revealed the presence at this point of a raised area, darker red than the surrounding mucous membrane and of a velvety texture. A specimen removed from this region showed that it was one of those rare instances where instead of squamous epithelium there are patches of cylindrical ciliated epithelium in the esophagus itself.

The treatment of the various diseases of the esophagus can be carried out at times with much satisfaction, and I may here cite a case referred to me by Dr. Willy Meyer, a patient with cardiospasm, upon whom Dr. Meyer had performed first a separation of both vagi from the esophagus (bilateral vagolysis) followed by esophagoplication, and second a plastic operation for the enlargement of the cardiac orifice. Esophagoscopy was performed some time after the operation, and I found, upon reaching the neighborhood of the diaphragmatic hiatus, that the esophagus made a sharp bend toward the left. A soft rubber tube could be passed through this bend, but the straight instrument could not be advanced, for the tissues in this region were dense and rigid. A special instrument was constructed by means of which I was able to straighten out this bend after a number of sittings, so that I was then able to pass the esophagoscope into the stomach. I then found that one

of the silk sutures which had been placed in this region at the time of the second operation was still present. Its entrance and exit into the esophageal wall could be distinctly seen, and the knot was found to be still firmly tied. In order to remove the suture it was first necessary to cut it. After the removal of the stitch the dense infiltration of the mucous membrane promptly disappeared, and the esophagus has remained straight since. I have passed the tube into the patient's stomach at frequent intervals since then and he is gradually learning to swallow his food.

THE ARTIFICIAL RESTORATION OF LOST OR MISSING TISSUES IN CONGENITAL CLEFT PALATE—A NEW DEVICE.*

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NEW YORK.

While the employment of mechanical appliances for cleft palate is not new, the appliance here illustrated and worn by patients who will demonstrate it, is *new* in principle.

This is the principle: *By restoring artificially all the missing tissue to as nearly a normal condition as possible, we restore the defective speech mechanism, permitting its normal function.*

There are two reasons for attempting to correct this defect, either surgically or mechanically: First, the improvement of the general health; and second, the improvement of the voice and speech. Nature intended that we should have separate channels for the air we breathe and the food we eat. We know that this is so because of the difference in the anatomical formation of these cavities. Provisons are made in the nasal passages for the warming, moistening and filtering of the air before it passes into the lungs. The oral cavity does not supply these requirements.

On the other hand, the highly sensitive mucous linings of the nasal passages are most unsuitable for the passage of the different foods. In cleft palate cases some food necessarily passes through a part of the nasal passages, and by constant irritation produces a catarrhal condition of these tissues, and provokes the secretion of a viscid mucus which contaminates the air breathed and the food eaten by these patients. But this is not all: These unfortunates are conscious that their defect is announced whenever they attempt to speak. This has a deplorable effect upon their physical and mental development.

* Presented at the meeting of the Surgical Section of the New York Academy of Medicine, January 5, 1917.

Again, the palate is one of the most important organs of speech. Its functions are concerned in forming the tone of the voice by regulating the shape and size of the resonance chambers, and to close off the nasal passages in the emission of certain sounds. This being impossible to a greater or lesser extent in cleft palate cases, speech is very

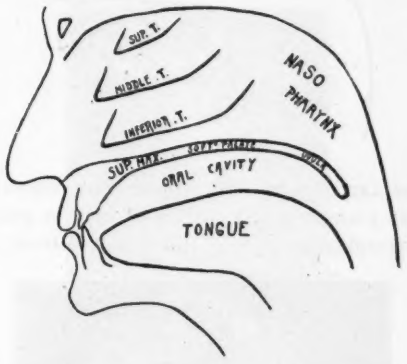

Figure 1. Sagittal section through nose, pharynx and mouth, showing the resonance spaces.

defective and gives it that peculiar quality which all can recognize.

To understand more fully the tissues involved and their functions, let us refer to the drawings:

Figure 1 shows the nasal cavities with the turbinated bones, superior, middle and inferior, on

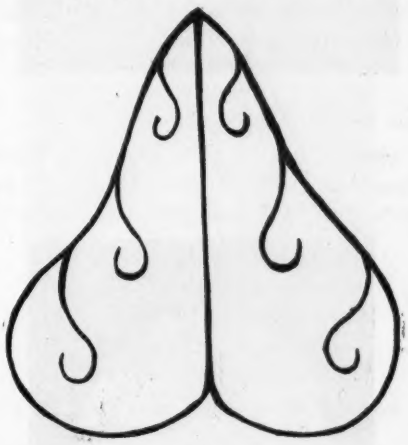

Figure 2. The six nasal resonance spaces formed by the turbinates.

either side, each forming a resonance space and, when separated by the septum, with the hard palate beneath, forming six distinct resonance spaces.

Figure 2 shows these spaces better.

Figure 1 shows also the large naso-pharynx, another resonance cavity, regulated as to size and shape principally by the soft palate and uvula.

Here can be seen also the oral cavity, still another resonator, with the tongue, soft palate, lips and teeth—all concerned in the production of voice and speech.

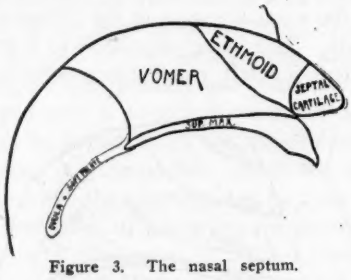

Figure 3. The nasal septum.

"The cartilage of the septum is a smooth, triangular plate inserted posteriorly into a groove in the perpendicular plate of the ethmoid bone. Anteriorly where it is thicker, it is connected with the nasal bones and adjacent lateral cartilage, and below with the vomer and palatal processes of the superior maxillary bones. The septal cartilage separates the anterior portion of the nasal cavities. The inner wall is the smooth septum formed principally by the perpendicular plate of the ethmoid bone, the vomer bone and the septal cartilage."

Figure 4. Plaster cast in a case of cleft palate. Showing absence of vomer, hard and soft palate.

Figure 5. Model of the mouth of a girl of 13.

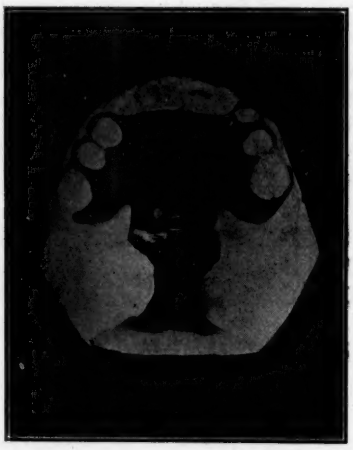

Figure 6. Appliance in position on model.

Figure 3 shows the septum of the nose.

Without any question, surgical closure of the cleft is the ideal method of treatment, *when it is possible to restore the function of the tissues.* But as Dr. W. J. Roe, of Philadelphia, says: "The closure of the cleft, even if surgically successful, un-

Figure 7. Palatal view of appliance.

Figure 8. Side view of appliance.

less it restores the functions of the tissue, invariably leaves the patient worse off than before, and also frequently prevents satisfactory subsequent treatment."

These conditions led me to make a special study of mechanical means by which these patients could

Figure 9. Model of cleft involving only the soft palate.

be helped, especially those of the adolescent or adult age.

Appliances of many shapes and of different materials have been devised for the closure of the cleft, but with apparently little regard for the res-

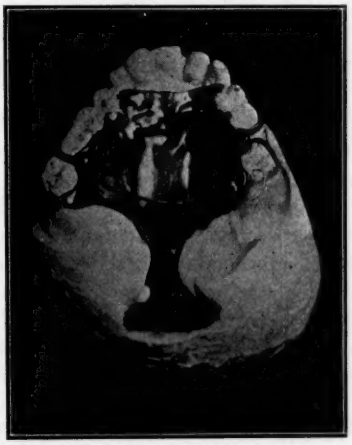

Figure 10. Appliance on model shown in Figure 9.

toration of the nasal passages, to permit normal respiration, or the restoration of the resonance chambers for the improvement of voice and speech.

With the vomer and the soft and hard palate missing, as in Figure 4, one can readily see the impossibility of shaping the resonating chambers to produce the proper sounds.

The oral and nasal cavities are practically one chamber.

In restoring this condition, the missing hard palate and vomer are reproduced in hard rubber, fastened rigidly to a supporting metal plate, which is firmly clasped to the teeth.

This restores the nasal passages as well as the

Figure 11. Palatal view of appliance shown in Figure 10.

roof of the mouth. This I believe is the first attempt, either surgically or mechanically, to restore the vomer bone.

The soft palate is the most important organ concerned in the shaping of the resonance chambers. Its muscular activity, while delicate, has quite a range of movement. To accomplish this in the artificial piece, the palate portion, also made of hard rubber, is attached to the posterior border of

Figure 12. Side view of appliance shown in Figure 11.

the hard palate by means of a specially constructed hinge. It is shaped to fit the cleft and has thin flanges on either side to rest upon the upper surfaces of the remaining palatal tissue.

Let it be understood that the appliance restores only the mechanism; improvement in voice and speech comes through persistent co-operation of the patient and instruction by a thoroughly competent teacher.

My patients have been very fortunate in being

able to receive this instruction through the Miller Vocal Art Science organization, founded by Dr. Frank E. Miller and conducted by Miss Adelaide Gescheidt, his only exponent, and her staff of assisting teachers.

Patients are trained through the principles of the "sevenfold pathway of voice," of Miller Vocal Art Science procedure—to co-ordinate the muscles of the body and harmonize its sympathetic nervous system. This brings about a perfect equilibration of the forces of the body and finally results in an automatic control of speech, voice and correct diction.

Three patients were presented, to show the possibilities in the improvement in speech and voice, by the aid of this appliance and proper instructions.

FIRST PATIENT, a female, seventeen years of age; has been wearing the appliance about one year, and has had instructions for six months.

With the appliance in place (figures V and VI) she demonstrated her ability to use her restored voice mechanism,

First, by *"buzzing the card"*:

This is a unique exercise, used to develop the breath control and certain phases of the voice. She is now able to blow a steady flow of breath through the lips.

Second: She repeated the Miller Vocal Art Science scales of vowels and consonants, showing the automatic usage of the speech muscular adjustments.

Third: She sang a song entitled "In the Time of Roses."

This showed her ability to enunciate almost perfectly, and also the resonance of the voice.

SECOND PATIENT, female, about 25 years of age, had worn the appliance for about a year and had eight months' instructions.

She recited some very difficult words and phrases, also a short poem.

THIRD PATIENT, girl, age 12 years. Had worn the appliance for about two years and had instructions for about six months. She recited many difficult words and a short poem.

This girl was unable to make herself understood before she had the appliance and the instructions. After two months, her diction became almost perfect, and she now is able to sing songs well, although she was utterly without sense of pitch or tone quality at the beginning.

17 EAST 38TH STREET.

FOCI OF INFECTION IN THE EAR, NOSE AND THROAT.

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The aim of this paper is to discuss the very great, and sometimes vital, importance of ear, nose and throat sepsis, as well as to consider preventive measures, prompt detection and early removal of foci of infection, to suggest the importance of a closer relationship between the dental and medical professions, as well as that of those engaged in the different departments of medicine and surgery.

There is very little in text-books on focal infection, and possibly at first thought one might presume this subject could be adequately dealt with in a brief paper. In my opinion, however, it should be said that hours would be necessary for the reading of a paper giving the results of the interesting and valuable investigation that has been made along this line, especially during the past three years.

As early as 1886, Chapin of New York made the observation that "rheumatism in children seems to have a tendency to attack mucous as well as serous surfaces, especially the tonsil;" and added, "it may seem somewhat forced to seek any relationship between throat, and especially tonsillar affections, and rheumatism, and yet they occur frequently enough to suggest the possibility of some connection besides a mere coincidence."

About twenty-five years ago Dr. W. D. Miller showed that septic conditions of the mouth caused constitutional diseases.

Despite the fact that these men called the attention of the dental and medical professions to the possibilities of constitutional conditions resulting from mouth and throat sepsis, we are told that less than four years ago the presentation of oral sepsis before the Pennsylvania Dental Society brought no discussion, so little was the interest in the subject. And about two years have passed since the subject of septic inflammation of the faucial tonsils causing so-called rheumatism, presented at the Pennsylvania Clinical Association, brought out the denial by certain of its members that polyarthritis could be caused by a septic tonsil.

The present wave of enthusiasm and large degree of interest in focal infection on the part of dentists and physicians is partially due to a careful review of the literature, but in no small measure to the most gratifying results following the removal of septic foci.

During the past three or four years clinicians, pathologists and bacteriologists, with the thoroughness of even animal experimentation, have accu-

mulated such convincing evidence that serious constitutional conditions may result from very small septic foci in mouth and throat that it would seem that no skeptics could still remain. It has been known for some time that septic foci in parts remote from the heart, e. g., abscess around an ingrown toe nail, may cause endocarditis. In the *New York Medical Journal*, April, 1916, Deland reported a case of furunculosis and carbuncles resulting from pyorrhea. This case was observed about fifteen years ago and marked the beginning of his study of the relationship of oral infections to constitutional diseases. For several years Deland has made a careful investigation of the mouth as a part of the routine of his examination of every patient. If endocarditis may be caused by an abscess around an ingrown toe nail and if furunculosis may result from pyorrhea, is it not reasonable to presume that this and allied conditions might result from septic tonsils or pus in the middle ear, mastoid or accessory sinuses?

During the past year or two a large number of cases of so-called rheumatism, rheumatoid pains, muscular rheumatism, swollen joints, etc., have been relieved by the removal of septic oral foci, especially of tonsils and teeth. The results have been so prompt, so favorable and so far reaching that one hesitates to tell all for fear of being thought unreasonable and over optimistic. However, it should be said that indescriminate removal of tonsils and adenoids without sufficient symptoms should be avoided. It is the consensus of opinion of leading laryngologists that the function of the tonsil is that of protection of the respiratory and digestive tracts in early childhood, but if sufficiently diseased it can no longer perform its function and only becomes a menace to the health of its possessor. Unless diseased, nature begins the process of absorption of the tonsil when the child is approaching puberty, usually when about 9 or 10 years of age; and if not diseased when the individual has reached about the eighteenth year the tonsil has disappeared. If diseased and fibrous the tonsil is not capable of absorption.

For the past two or three years I have given considerable attention to general infections by way of ear, nose and throat, and especially by way of the tonsillar ring. During the past two years, including my work in the San Diego County free medical dispensary, the San Diego City and County Hospital and the Children's Hospital, of the 700 tonsillectomies I have done and of the comparatively large number of nasal accessory sinuses I have operated upon, the most of the tonsillectomies and a large percent of the sinus operations were done for focal infection. I do not know the percent, but among the constitutional conditions the majority of the patients suffering from malaise and a varying degree of anemia. Hunter has found that chronic septic oral conditions frequently precede even pernicious anemia and that a septic mouth is among the causes.

The most common constitutional symptom of focal infection that I have noticed, and concerning which very little mention is made, is indisposition or malaise, often to the extent of great fatigue, due presumably to the chemical toxins produced by pyogenic bacteria. Every oto-laryngologist of any considerable experience has frequently observed cases of this kind. It is my opinion that a large percentage of patients applying to their physicians for relief from malaise, or even great fatigue, have one or more foci of infection somewhere in the body. The fact that such patients experience complete relief from the removal of the foci of infection affords the evidence of proof. No doubt in many a case the individual who has suffered for weeks or months from this symptom of focal infection, and who has during this period been working continuously, may naturally, though falsely, presume that whatever the degree of fatigue, it is due to overwork. Depletion of physical or mental vitality caused by toxemia from oral sepsis, predisposes to disease by lowering one's resistance, and oral sepsis lessens one's efficiency as well as furnishes the cause of a certain long list of constitutional diseases. The following case of a young lady who had given up her profession because of being physically incapacitated especially emphasizes this symptom:

Miss B., aged 25, stenographer, referred to me because of symptoms of focal infection. For about seven years she had rheumatism in different parts of the body, not being free from pain in all that time. For three months she had severe pain at the base of brain and a feeling of a constricting band around the head, soreness of the cords of the neck radiating down the shoulders, very severe pain in right side. A tonsillotomy had been done but without improvement. She had undergone operation for appendicitis and the appendix found normal. At the time of examination she was complaining especially of malaise, was anemic, had pain at base of brain, sense of constricting band about head, soreness of cords of neck radiating down shoulders, severe pain in right side, and for years a large number of canker sores in mouth. For about six months prior to the tonsillectomy done by me she had afternoon temperature ranging from 99° to 100°. Her tonsils were found to be cryptic and harboring infection, and on the 18th of last May they were enucleated. Two months later Miss B. reported relief from all the symptoms from which

she was suffering at the time of operation and a gain of thirteen pounds in weight.

It was largely through the painstaking work of Rosenow that the association of the offending focus with the resulting constitutional conditions was demonstrated, as well as the identification of the bacteria involved. As a result of his work in this line Rosenow believes that arthritis, neuritis, neuralgia, migraine, gastric and duodenal ulcers, cholecystitis, appendicitis, and even such obscure diseases as Hodgkins' disease, the leukemias and pernicious anemia may be due to oral sepsis. Some twelve or thirteen years ago Rosenow, with Billings cooperating, began animal experimentation to prove the relation between foci and infections.

According to Rosenow streptococci vary in virulence in terms of their exposure to oxygen, and one strain of streptococci may be converted into another of higher or lower virulence. When inhabiting a susceptible host virulence increases. Under certain conditions a streptococcus may become a typical encapsulated pneumococcus. Certain strains possess an affinity for certain tissues, the streptococcus viridans for joints, tendons, aponeuroses, muscles and the endo-, peri-, or myocardium. Pus draining from pyorrheal pockets, tonsils, sinuses, etc., is far less virulent than pus under retention, due not only to the fact that there is less absorption, but that the microorganisms are more or less exposed to oxygen. Often in a tonsillotomy where even a small portion of the tonsil is left, the crypts in this portion are sealed and the streptococci contained in the sealed crypt or crypts are more virullent and more harm results, due to the fact that oxygen is prevented from coming in contact with the germ, as well as the resulting interference with drainage. There is no physiologic reason why a portion of a diseased tonsil should be allowed to remain yet there are surgeons who contend that they do not believe in tonsillectomy. Let us hope that in no case a surgeon shall advise tonsillotomy for the reason that it requires less perfect technic and less training and experience. To do a creditable tonsillectomy and get the results to which the patient is entitled the surgeon must have had special training and experience. A good general surgeon may have a very imperfect technic in the surgery of the specialties.

Before leaving the consideration of tonsillotomy in contradistinction to tonsillectomy I shall cite another concrete example—a case in which a tonsillotomy was done eight years previously by a surgeon who does not believe in tonsillectomy:

Edmund D., aged 16, referred to my clinic because of symptoms of focal infection presumed to be caused from diseased tonsils. This boy was found to have considerable malaise, irritability, anemia, etc., as well as to give a history of frequent sore throat and a marked susceptibility to head colds. There was about two-thirds of each tonsil still remaining, and through the plica supratonsillaris above the left tonsil there was an opening about the diameter of a slate pencil. This fistulous tract extended downward and backward. During the enucleation of this tonsil fully half a teaspoonful of pus escaped into the throat. In a few weeks this boy reported relief from the above symptoms. If a tonsil is diseased, remove it all.

In those cases of diseased tonsils in which it may be desirable to provide for treatment by autogenous vaccines, I recommend that cultures be taken from the contents of the tonsil crypts immediately following the tonsillectomy. Special effort should be made to get the culture from the depths of the crypts. It has been found that most of the organisms are located in the deeper parts of the crypts.

The present attitude of the medical profession relative to focal infections as a cause of so-called rheumatism, now known as polyarthritis, and allied conditions, seems to be somewhat like this: In every case the cause should be looked for and will usually be found in some focus of infection somewhere in the body. It may be in the mouth, the accessory sinuses, the middle ear or mastoid, the respiratory tract, the digestive tracts, or the urinary tract, and in old people there may be a focus of infection due to chronic purulent tracheo-bronchitis. But the faucial tonsils because of their gross and their histological anatomy are especially adapted to become reservoirs of infection. According to Deland the teeth are the most frequent sites of focal infection, the tonsils second in order, accessory sinuses third, while Beck believes that foci of infection are more frequently found in the faucial tonsils than in all the other organs combined. A septic tonsil may be normal in size, or may be even markedly atrophied and show no sign of being diseased, yet prove at time of enucleation to be the site of an abscess; and a very slight tonsillitis is sometimes followed by nephritis, arthritis, endocarditis, myocarditis, appendicitis, etc., and not infrequently inflammatory processes of the eye result from focal infection especially of accessory sinuses and tonsils. In a communication by Dr. DeSchweinitz relative to the treatment of iridocyclitis and uveitis special emphasis was given to the value of making thorough search for focal infection. At the last meeting of the Pacific Coast Oto-Ophthalmological Society, Dr. Veasey read a very interesting paper on chronic infection of the tonsils as a causative factor in the production of paralysis of the accommodation, and reported cases

in which complete relief from impaired accommodation resulted from enucleation of the tonsils. Skin eruption and pruritis sometimes occur from oral sepsis. I have had a few cases of rash and itching of the skin that cleared up after the removal of septic tonsils.

To facilitate my investigation of a new case in which there is any suspicion of focal infection I have on my history card by way of suggestion the following outline:

Teeth?	Cystitis?
Eyes?	Cholecystitis?
Malaise?	Constipation?
Disposition?	Anemia?
Myositis?	Neuralgia?
Myocarditis?	Endocarditis?
Gastric or Duodenal Ulcer?	Thyroiditis?
	Appendicitis?
Arthritis?	Nausea?
Neuritis?	Bad breath?
Cervical Adenitis?	Cheesy beads?
Migrain?	Recurrent tonsillitis?
Nephritis?	

My first personal experience with tonsillitis being followed by acute nephritis was in Denver (1908) in the case of

Philip G., a boy of seven years. This boy was the son of over-anxious parents and I was called to see him for a very slight tonsillitis. The symptoms scarcely seemed to justify my medication, but a grain of calomel followed by a cathartic, aspirin and an alkaline gargle were prescribed, and the parents were assured that in a day or so their son would be all right again. However, a few days later the parents became alarmed and I was asked to call. This time I found the little fellow quite free from throat symptoms but presenting a pronounced septic appearance. A sample of urine was found loaded with albumen. A desperate but not fatal case of acute nephritis developed and the combined efforts of two physicians and two trained nurses were given for several days to save the boy's life. He had convulsion after convulsion and for two days and two nights his life seemed to hang by a thread. After his recovery his tonsils were removed.

Only recently I had another severe case of acute nephritis following a slight tonsillitis.

Not long since Mrs. R. was referred with the history of having neuritis of nerves of neck and arm and enlarged painful joints of feet, and with a history of obstinate constipation of several years' standing. Upon examination the faucial tonsils were found to harbor foci of infection, and this despite the fact the patient said she did not remember ever having tonsillitis except one recent slight attack. In addition to the symptoms given above Mrs. R. complained of general indisposition and queer little rheumatic pains quite generally over the body. In less than a month after the enucleation of the tonsils all of the above symptoms passed away and the patient, who had lost considerably in weight, gained over ten pounds. She especially emphasized the fact that she had been completely relieved from the obstinate constipation within a week's time.

While this case emphasizes the potential relief from poly-arthritis by tonsil enucleation, it also records relief from a symptom to which I have seen no reference made, namely, obstinate constipation. Shortly after this tonsillectomy I enucleated the tonsils of one of the local school teachers, Miss C., referred by Dr. Allen. Within a few weeks following the operation Miss C. reported, among other improved conditions, relief from obstinate constipation which had been of several years' standing. These together with subsequent cases make it appear that some relation exists between infected tonsils and constipation. At first I was disposed to look upon this as coincident but am convinced from the frequency of relief from this symptom, it must be more than coincident. Possibly the relief obtained is due to the removal from the system of chemical toxins which emenate from bacteria harbored in foci of infection.

It has been found that sometimes the tonsillar infection becomes latent and produces months later very serious trouble at points far away from the original site. The patient makes a recovery from the acute tonsillitis, but there is often latent foci of infection remaining deep in the crypts of the tonsil and the evidence of infection may not occur for months or even years after the acute sore throat. Given, then, a case with symptoms of systemic infection, it is up to the physician to inquire into the history of sore throat at any time previous. It is not necessary that the patient complain of recurrent attacks of tonsillitis or any degree of throat soreness, and it should also be remembered that objective evidences of acute as well as chronic tonsillitis present not infrequently, when the patient gives no previous history or does not at the time complain of sore throat. Even in cases with no previous history of tonsillitis abscesses are at times found in the tonsil at operation. About six months ago a little girl of nine years was brought to me by her father for careful examination of nose and throat, the father saying the child had always been "puny" and unlike other children—did not play much, was easily fatigued, but gave no history of tonsillities. A careful examination revealed only a slight involvement of the naso-pharyngeal tonsil, and as far as I could determine there was no objective involvement of the lingual or faucial tonsils; but the history, the appearance of the child, the presence of chronic cervical adenitis,

suggested focal infection and by the process of exclusion the focus was presumed to be in the faucial and naso-pharyngeal tonsils and tonsillectomy and adenectomy advised. During the enucleation an abscess in one tonsil broke and a small amount of bad-smelling liquid pus escaped into the throat. This was swabbed out as quickly and as thoroughly as possible but the child was very ill for a week or more following the operation. For several days she had high fever, rapid pulse, and presented a picture of marked sepsis. Now the little girl is well and strong, plays like other children, and has gained very materially in weight.

It has been my observation that in a very large per cent. of infected tonsils there is associated cervical adenitis. Gardiner claims that in about 80 per cent. of chronic cervical adenitis in which no obvious source of infection is present the tonsils are infected.

The following case records improvement in a thyroiditis from tonsil enucleation:

Miss P., trained nurse, referred by Drs. Coburn, Owen and Fly. She had had tonsillitis and quinsy at times most of her life. She complained of malaise, soreness in muscles, was anemic, had arthritis from time to time, there was a dull aching in the thyroid gland, tendency to syncope and heart palpitation when tired. Upon examination the tonsils were found to be cryptic, small, submerged and harboring foci of infection. There was a thyroiditis. The neck measurement over the thyroid was 15½ inches. The tonsils were enucleated nearly two years ago and favorable results were reported after a few weeks following the operation. At the present time the patient reports freedom from all symptoms given at time of operation, and the neck measurement has decreased 1½ inches.

The next case I wish to report illustrates the effect of tonsillar focal infection upon the digestive tract:

Mrs. M., aged 36, housewife, about a year ago, after being treated by several physicians for as many ailments, was convinced, of her own volition, that the cause of a very stubborn continuous indigestion, covering a period of several years, associated with pronounced nausea and offensive breath, was due to diseased tonsils. She was at this time anemic and very much emaciated. Her tonsils were found to be submerged, cryptic, with the crypts unusually full of offensive cheesy pus. A tonsillectomy was done the second day of September of last year. Within a few weeks following the enucleation her nausea disappeared, her digestion became quite normal and her breath was no longer offensive. Her improvement in general health was quite rapid. Only a few days ago she reported a gain of 30 pounds in weight. Her color is good and she says she is perfectly well.

Patients complaining of offensive breath or bad taste in the mouth should always lead one to investigate the tonsils and accessory sinuses relative to their harboring infection.

Tonsillar investigation is done by carefully inspecting the tonsils with the tongue well depressed. If there is infectious material present in the crypts of the tonsil or between the pharyngeal pillar and tonsil, it will often cause an inflammed or congested appearance of the tonsil, the plica tonsillaris, as well as the anterior and the posterior pillars, thus indicating inflammatory reaction, and there is sometimes slight edema. With the tongue well depressed, pressure against the anterior pillars with the end of a tongue plate, liquid pus or cheesy infectious beads of foul smelling products of decomposition will be expressed from the tonsil crypts. These cheesy masses are composed of food particles, saliva and bacteria.

Diseases of the nasal accessory sinuses are more prevalent than is supposed by the average physician. The symptoms given by the patient are seldom well defined and cannot always be depended upon, however they should be carefully taken and duly considered. But the objective symptoms are reliable, and if sufficient time is taken and careful observation made, one of experience need not with the present aids, often fail to make a correct diagnosis. No one is unfamiliar with the methods of examination now employed, viz.: application of adrenelin, use of negative pressure, transillumination, and *x*-ray in locating involvement of the nasal accessory sinuses. The intranasal relations and the intranasal balance should be as nearly normal as possible, in order that there be proper ventilation of the nose and no impairment of drainage of the sinuses.

Perhaps at this time it should be said that nasal congestion even to the extent of nasal stenosis, is not infrequently due to diseased tonsils and adenoids. This is probably due in part to non-use of nose, but in no small measure to the chemical toxins emanating from diseased tonsils and adenoids. A badly deflected nasal septum produces nasal imbalance which may be unilateral or bilateral. As a result of this imbalance there is lack of vaso-motor control and more or less continuous vaso-motor dilation of the nasal erectile tissue, therefore increased nutrition, resulting in growth. If the growth or congestion is sufficient to cause approximation of two surfaces of mucous membrane there will be in addition to nasal reflexes, an accumulation at that point of nasal secretion and bacteria, and this in itself, due in part to lowered vitality and sometimes break in continuity, become a source of infection.

The following is one of many concrete examples of the impairment of ventilation and drainage resulting in infection of the nasal accessory sinuses. In this case there was an excessive bilateral maxillary sinus empyema, due no doubt primarily to hyperthrophic rhinitis, the stenosis being subsequently increased by the development of polypi.

Mrs. H., referred by Dr. Dotson, complained of arthritis in shoulder and knee, severe frontal headache and aching over cheek bones and under eyes, excessive pus discharge from both nostrils, mouth breathing. Symptoms of focal infection were malaise and arthritis of shoulder and knee. She was found to have hypertrophied turbinate bodies, nasal polypi and empyema of both antra. Both antra were operated upon with the result of practically cessation of pus discharge and complete relief of the arthritis together with great amelioration of the other symptoms.

Among the number of similar cases that I have seen is the following:

Eugene M., aged 15, for several years had frequent attacks of sore throat with high fever, nausea and vomiting, swelling and soreness of glands in neck and groin. These attacks were always associated with great prostration. Between attacks he complained of being "tired," no appetite, was irritable and had pain in side on slight exertion; was undeveloped. Examination revealed large, fibrous, cryptic tonsils. By pressure, beads of cheesy pus were expressed from the tonsil crypts; adenoids were also present. The tonsils were enucleated and the adenoids removed on the first day of February of this year, and whereas the sick spells referred to had formerly occurred every month or two there has been no attack of sickness of any kind in the eight months since the operation. The patient has gained materially in height and weight and shows marked improvement in many ways.

No doubt many of the attacks in childhood of slight fever, indisiposition, lack of appetite, headache, etc., attributed to the stomach, are really due to a mild infection by way of the tonsils.

A history of frequent colds in the head should cause one to investigate the condition of nose and throat, and especially Waldeyer's ring, perhaps better called the tonsillar ring, consisting of naso-pharyngeal tonsil, lingual tonsil, as well as the faucial tonsils. Situated immediately below the faucial tonsil there is not infrequently follicular, lymphatic tissue which is capable of harboring infection. Dr. Matthews of Rochester called the attention of the profession to this offending area. Among the cases I have observed there were several of septic follicular lymphoid tissue immediately below the faucial tonsils. When such tissue presents it is best that it be carefully and thoroughly removed.

In the case of Miss S., referred by Dr. Donnell, there was an especially excessive amount of follicular lymphoid tissue in this position. With Miss S. the focus of infection as well as the cause of a very distressing cough was diagnosed as being in large measure due to sepsis and hypertrophy of this tissue. Because of the cough in question, previous to coming to Dr. Donnell, the young lady had been treated for pulmonary tuberculosis. Following the enucleation of the faucial tonsils and a careful dissection of the follicular tissue below the tonsils, the symptoms of focal infection and the cough disappeared.

Not infrequently susceptibility to grippe results from diseased tonsils. As evidence of proof one need only refer to his case histories and note the relief obtained in this particular following the removal of diseased tonsils.

The literature records but few instances of cystitis resulting from tonsillar infection, but there appears to be some selective action between tonsillar infection and cystitis. Among my cases there were a few suffering from chronic focal infection of the tonsils associated with cystitis who reported relief from the cystitis following the tonsillectomy.

When a patient complains of earache, especially a child, among other things think of adenoids as well as teeth and tonsils. The location of the naso-pharyngeal-tonsil makes it especially likely to infection via nose as well as mouth. Infection of this tissue has been found to cause a loss of the ciliated epithelium and replacement by squamous epithelium, thus rendering it more susceptible to subsequent infection. It should also be remembered that adenoids have been found in the early months of infancy and cases have been reported where hypertrophy of the naso-pharyngeal tonsil existed at time of birth. The naso-pharyngeal tonsil may become infected via nose from purulent rhinitis, sinusitis, inspired air laden with pyogenic bacteria, etc. Via mouth the naso-pharyngeal tonsil may be infected from septic faucial tonsils, septic teeth, etc. It should be remembered that the mouth is a hotbed of bacteria and at all times there are in the mouth pathogenic germs capable of doing great physical harm to their host even at points far away from the mouth if they can somehow gain entrance to the blood stream. The portal of infection in the faucial tonsil is the crypt, in the naso-pharyngeal and lingual tonsil the sulcus and in the lymphatic tissue found below the faucial tonsil, the follicle. Very frequently foci of infection are harbored in the folds of the naso-pharyngeal tonsil and there is an extension to the middle ear and mastoid. Shambaugh believes that even some of the labyrinthine cases of obscure origin may be caused by focal infection, usually from the tonsils or teeth.

Dr. T., a California aurist, whom I met recently, told me of his own personal experience with a serious labyrinthine involvement with perfectly normal middle ears. It was found after careful investigation that abscesses at the roots of certain teeth were the cause of the irritation, and after the extraction of the diseased teeth the labyrinth symptoms completely subsided. It is my habit in cases of labyrinthine involvement of obscure origin to investigate the tonsillar ring and accessory sinuses, as well as to refer to a dentist for radiograms.

The following case is reported for the reason that I found but one case in the literature in which there was mention made of relief from rheumatoid arthritis through a radical mastoid operation.

Miss P., aged 15, referred by Dr. Allen, had measles at four years of age followed by discharge from left ear; discharge continued for a period of eleven years. At the time of examination the patient, in addition to the ear symptoms, was anemic, complained of malaise and very severe pains from arthritis of elbows as well as severe pain in head. A radical mastoid was performed in February of this year. The arthritis in elbows quickly subsided, the headache ceased and the anemia and malaise have disappeared.

The following case shows symptoms of focal infection proven to be due to a focus in the middle ear and mastoid.

Miss M., aged 20, referred by Dr. Parks, had history of frequent sore throat, was a mouth breather, had some rheumatism, headache. Scarlet fever when a child left her with a discharging right ear. On examination the faucial tonsils were found to be cryptic, containing infectious beads of cheesy pus, and there were also adenoids. On March 25th, 1915, the tonsils were enucleated and the adenoids removed, with resulting relief from mouth breathing and sore throat. It was hoped that the removal of the diseased tissue of throat and nasopharynx might clear up the ear discharge, as it often does, but in her case, this, together with thorough treatment of the middle ear for a period of several weeks, failed to show any great improvement in the chronic purulent otitis media. In January of this year she was anemic, suffered from great malaise, was extremely irritable, nervous, had severe pain at base of brain, and, as she put it, "Could not think straight." She was losing in weight and had excessive discharge from the middle ear. A radical mastoid operation was done on the 22d of January of this year with the result that the young lady is relieved from the anemia, the malaise, polyarthritis, the pain at base of brain, has gained several pounds in weight, says she has a great deal of vital force and a clear mind.

Swelling and inflammation of the cervical, sublingual and submaxillary glands suggest infection by way of the mouth, and one should always investigate the faucial and lingual tonsils as well as the teeth.

Vincent's angina, which must be differentiated from chancre of the tonsils, diphtheria, etc., and which often causes suppuration of the cervical glands involved, as well as the systemic complications of nephritis, painful joints, etc., frequently enters the system via the faucial tonsils.

In Ludwig's angina with its systemic complications and high mortality, the tonsil is not infrequently the portal of infection, although it often gains entrance into the sublingual and submaxillary glands via floor of mouth, ulcerated teeth, etc. In a patient that I saw in consultation with Dr. Loos a few months ago a fatal case of Ludwig's angina began as a slight tonsillitis.

It has been found that mixtures of staphylococci, forms of streptococci, coli communis bacilli and tubercle bacilli are frequently concerned in chronic focal infection. But it should be remembered that there may be several different foci of infection with as many different strains of bacteria. In other words, finding a focus of infection in a given organ is not proof positive that one or more other foci may not exist even in parts quite remote from the one found. Hence the necessity of cooperation of dentist, internist, general surgeon, specialist, etc. Where there are several foci of infection found, it is only reasonable to presume that the removal of each one aids nature in direct proportion to the severity of the one removed in her efforts to overcome the effect of those still remaining.

The following comparative failure on my part affords a concrete example of what I have in mind.

Mr. R. was referred for examination of the nose and throat. Among his symptoms were soreness in neck muscles as well as pain and stiffness in upper dorsal spine. His tonsils were found to be small but cryptic and containing cheesy pus. Enucleation of the tonsils resulted in improvement in some ways but the myositis and spinal arthritis did not appear to be helped in any particular. Several months later one of our local dentists extracted a sensitive tooth and found a root abscess. In a short time following the extraction of this tooth the arthritis disappeared and the pain in muscles of neck was relieved. My memory of this case is an ever-present reminder that the teeth should be investigated as well as the nose, throat and other portions of the body which are capable of harboring foci of infection.

In conclusion: The effects of foci of infection vary in terms of the virulence of the microorganism, the length of time that the focus has existed, whether there be a large or small number of organisms, as well as the amount of chemical toxins gaining entrance to the lymph and blood streams, whether the absorption be fast or slow, the degree of impairment to the integrity of the involved tis-

sues and the relative immunity or susceptibility of the individual.

I believe that the subject of focal infection is of sufficient importance that in the interests of humanity every physician should thoroughly qualify that he may best serve those who apply to him for relief from the resulting symptoms.

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VERTIGO: ITS CAUSES AND METHODS OF DIAGNOSIS.

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PHILADELPHIA.

The subject of vertigo is as old as the healing art itself and medical literature abounds with essays on the subject. When vertigo was seen to accompany certain diseases, it was spoken of as vertigo belonging to that affection. Thus when it appeared in the course of nephritis, it was renal vertigo; if in association with an affection of the liver, it was hepatic vertigo, and so on. As a result there were almost as many kinds of vertigo as there are diseases; but when the vertigo appeared independently and not in the course of some disease, it was termed idiopathic or essential vertigo. That vertigo was essentially a disturbance of equilibration was gleaned long ago, but so long as the equilibratory function itself was not clearly understood, vertigo remained in the land of mystery.

For many centuries the individual was regarded as possessing only five special senses; that is, sight, hearing, taste, smell, and touch. A great advance was made when the sixth sense—the so-called "muscle-joint-and-splanchnic sense" came to be recognized. Recent studies of the internal ear, however, show that there is still another, seventh, special sense, the so-called "static sense". This static sense is a special sense a truly as any of the other and corresponds to them in its general anatomic and physiologic requirements. Similarly to them, it has an "end-organ" for receiving stimuli,

a conducting nerve for conveying sensations, and definite nerve tracts leading to brain centers where the stimuli are interpreted and translated into equilibration.

A host of investigators have conducted experiments showing the effect on equilibration when the internal ear is either partly or completely destroyed. As a result of these, it is now universally recognized that the static portion of the internal ear is the chief organ of equilibration—in other words, it is the "end-organ" of this seventh "static sense". To be sure, the ear is not the only organ concerned with the equilibratory function. The equilibrium of the body is maintained because of an harmonious cooperation of *three* senses—sight, muscle, and static sense. Of the three, however, the end-organ of the static sense is of peculiar interest because its *only* function is the maintenance of balance, whereas with respect to the other two, equilibration is simply a collateral function.

Summing up, then, we must have in mind the following:

1. Equilibrium of the body is maintained chiefly by the ear and its associated pathways and centers known as the vestibular apparatus, aided by the sense of sight and muscle sense.

2. Vertigo is a sensation perceived within the brain when perfect equilibration is interfered with.

From the foregoing it is evident that in considering the causes of vertigo we must look for disturbances that will affect the chief organ of equilibration, namely, the vestibular apparatus. From a medical standpoint, therefore, the most important aspect of the study of the static portion of the internal ear and its innervation is the subject of vertigo. The clinician is often confronted with cases of dizziness that tax his ingenuity to the utmost, and it is surely not overstating the fact to say that until recently he was able at best only to guess as to its significance. The realization that the ear is the chief organ of balance has thrown a new light on its importance. Previous to the conception of the ear as an equilibratory organ, the general practitioner regarded this organ somewhat as follows: if the patient be deaf, a specialist should see what he can do to improve the hearing, and if there be any inflammation of the ear, it should receive local attention. But far more important and yet scarcely recognized is the part that the static portion of the ear plays in the well-being of the entire body. The aurist knows of the recent advances in the study of the ear, and it may not be amiss to emphasize their importance to the general practitioner as well, because of

1. The necessity of recognizing certain internal ear conditions and appreciating their remote relations.

2. The far-reaching significance of the ear as the sense organ of equilibration.

3. The value of the newer ear tests in determining the cause of vertigo, no matter what its type or origin. It is with such cases that the physician comes in daily contact.

The general practitioner is familiar with conditions of the external ear, the middle ear, and the cochlear portion of the internal ear. In the external ear he encounters impacted cerumen, foreign bodies, eczema, furunculosis, etc. In the middle ear he has to deal with various types of deafness and with inflammatory conditions. Affections of the cochlea manifest themselves by impaired hearing and noises in the head. In the presence of such conditions, the attention of the physician is immediately called to the ear, in fact the patient himself recognizes that he has an ear condition. All these are of interest from a local standpoint only, but the static portion of the ear, on the contrary, is part and parcel and servant of the whole organism. A big, strong, healthy man may be unable to stand up or even sit up in bed because of a silent congestion of the internal ear. Perhaps the lesion is no larger in extent than the head of a pin and yet the patient may be entirely incapacitated. Just as affections of the cochlea are manifested by impaired hearing and tinnitus, so the disturbance of the static portion of the internal ear may cause dizziness, staggering, nausea, vomiting, and diarrhea; but whereas tinnitus and deafness at once point to the ear, we venture to say that when confronted with dizziness and nausea, the general practitioner may not suspect the ear as the source of the trouble. The cases of vertigo from ear conditions, with nausea, vomiting, and retching, that are treated with "stomach powders" are exceedingly numerous, and it cannot be too strongly emphasized that vertigo from whatever cause can result only from an affection of the vestibular apparatus directly, so that under such circumstances the condition of the ear and its associated pathways should be thoroughly investigated.

Vertigo may be of two kinds:

1. Experimental or induced vertigo.

2. Vertigo resulting from disease.

Experimental or induced vertigo results when the equilibratory end-organ is powerfully stimulated by artificial means. Normally every conceivable motion of the body—be it in a linear or rotary plane—causes a movement of the lymph in some portion of the static labyrinth, either in the saccule or the utricle, or in the semicircular canals, and this in

turn stimulates the sensitive hair-cells of the end-organs there present. The impulses thus generated are carried along the vestibular nerve pathways to their respective centers. Inherited memory dating back for countless ages, as well as innumerable repetitions of this sort during the individual's life-time result in a correct interpretation as to the meaning of all these stimuli, and the person learns to know that a certain stimulus or set of stimuli always mean a certain kind of motion. The individual has also learned that this sort of information is reliable and trustworthy, and in accordance with fact. He is, therefore, not in the least disturbed by them. Should the lymph in the labyrinth, however, be made to move violently by artificial means, such as can be brought about by turning an individual in a revolving chair or douching the ear with cold or hot water, he would then be getting information that is not true to fact. For example, after he is turned in a chair and suddenly stopped, the endolymph still continues circulating, conveying the information to the brain that he is moving, whereas as a matter of fact, he is not. Here, then, he has information which is not in accord with fact, and he therefore has vertigo. While he was being turned, the endolymph moved and conveyed to him the sensation of motion, but that produced no vertigo because it was in accordance with actual facts—his previous experience assuring him that he was actually moving. Cooling or heating a portion of the labyrinth by means of douching also produces motion of the lymph. Since, however, the individual is sitting quietly in the chair all this time, such information is not in accordance with fact and results in vertigo. This induced or experimental vertigo is of great service in the study of the integrity of the pathways responsible for this vertigo and can be made of great clinical value.

Vertigo resulting from disease is entirely differen‘ It results whenever there is an interference with the perfect balance between the special static organs on each side. Both ears always act in unison and are constantly sending out an equal flow of impulses to the musculature of the body insuring perfect equilibration. When diseases destroys the apparatus on one side completely or partially, or produces an irritation—be it in the ear itself or along any pathway leading from it—there immediately results an inequality of tonic influence as between the two sides, with a resulting disturbance in equilibration, and vertigo. The important thing to remember is that is is always a disturbance of the ear and its associated pathways and nothing else that can result in vertigo. When disease in remote organs causes vertigo, it is only because of a definite influence on the ear mechanism.

Vertigo may be caused by

1. Lesions within the internal ear, such as labyrinthitis of the various types, or effusions or hemorrhage within the internal ear. Inflammatory conditions of the middle ear, for instance acute otitis media or mild inflammation of the inner ear itself, produce only irritative effects if any, so that the papatient suffers from more or less vertigo as long as the acute state of the congestion lasts; the vertigo vanishing with the disappearance of the inflammation. On the other hand, slow degenerative changes within the labyrinth or sudden destruction of the whole or a part of one labyrinth is accompanied by marked vertigo, nausea, and vomiting, and loss of equilibration. Sudden destruction of the whole or a part of the labyrinth may be produced, rarely by trauma, but usually by hemorrhage or serious effusion into the labyrinth and it may occur in the course of diabetes, Bright's disease, or of any condition in which the vascular system becomes affected. It is this class of cases that exhibits the so-called Meniere's symptom complex. The hearing in these cases usually is markedly affected, if not altogether lost, and the condition is characterized by repeated attacks with a suddenness of onset, the violence of the symptoms quickly reaching a climax and then gradually subsiding and all disappearing when the brain centers have acquired the function of compensation.

2. Toxemias affecting the ear or other portion of the vestibular apparatus, such as ptomain poisoning, constipation, alcoholism, poisoning by chemicals, as for example lead poisoning, nephritis, gout, rheumatism, syphilis, and the toxemia of infectious fevers such as scarlet fever, typhoid fever, and mumps.

3. Definite lesions along the pathways from the ear within the brain itself, such as tumor, hemorrhage, thrombus, infarct, abscess, gumma, tubercle, specific neuritis, multiple sclerosis, syringomyelia, polio-encephalitis, or meningitis.

If vertigo can be produced only by disease affecting the vestibular apparatus, then it follows that in order to determine the cause of vertigo, we must employ those tests that differentiate the function of this apparatus. Such an examination comprises a search for any spontaneous vestibular phenomena that may be present, as well as an analysis of the responses to ear stimulation. Of the two methods, the latter is by far the more important. We start out with a fixed and definite idea that a normal internal ear, intact nerve pathways leading to normal nerve centers, will *invariably* produce a rhyth-

mic nystagmus and vertigo when a stimulus is applied.

The nystagmus lasts twenty-six seconds in a certain direction when the individual is turned in a chair ten times, and the vertigo also is of twenty-six seconds' duration. Because of the vertigo there also appear past-pointing and falling. If, on the other hand, stimulation of the internal ear fails to produce one or all of the responses, the evidence points positively to an impairment at some point of this apparatus. A knowledge of the anatomy of the vestibular mechanism is of course indispensable, and one's ability to make a correct diagnosis as to the location of any lesion causing vertigo depends entirely on his powers of visualizing the anatomical pathways that constitute this vestibular apparatus, as far as these are known. The static portion of the internal ear is the starting point for all nystagmic and vertigo impulses. Any stimulation applied to the internal ear, be it turning or douching, affects all nerve endings in like manner, and we think it highly improbable that there could be a lesion that would affect the hair cells concerned in the production of nystagmus without affecting also the hair cells concerned in the production of vertigo. If, therefore, stimulation of the internal ear fails to produce any response at all, or when *all* the responses are affected similarly, we conclude that the lesion is either in the labyrinth itself, or in the eighth nerve. If on the other hand, stimulation of the internal ear produces one good reaction at the same time that the other responses are absent or markedly impaired, it is obvious that the internal ear itself and the eighth nerve are intact, and that the lesion is located centrally; that is, after the eighth nerve has divided into its component portions on entering the brain-stem at the junction of the medulla oblongata and the pons. If stimulation produces poor nystagmus, the block is obviously in the vestibulo-ocular tracts; whereas, if it is the vertigo which is subnormal after stimulation, the block must be located along the vestibulo-cerebello-cerebral tracts—those concerned with the production of vertigo. A knowledge of the course that all these tracts pursue within the brain substance enables one to locate accurately the site of the lesion responsible for the vertigo. However, it not infrequently happens that patients complaining of vertigo when tested show normal reactions to ear stimulation. In these cases, it is obvious that we are dealing with a condition in which the vestibular apparatus is irritated at some point, and a search should be made for such a source of irritation. This may be a focus of infection in the tonsils, teeth, stomach, kidneys, etc.

Therefore, just as we examine the urine in nephritis or diabetes, or as we have a Wassermann test made in cases of suspected syphilis, just so the ear-tests enable us to analyze the apparatus responsible for dizziness. Instead of guessing, we then learn the reason for the vertigo. Based on an experience of hundreds of examinations of pathological cases in the department of Neuro-Otology at the University of Pennsylvania, we do not hesitate to say that it is very rare that a "dizzy" case remains obscure after these ear-tests, and in most instances the diagnosis becomes clear and simple. After these tests are made we are able to say for example that the patient is dizzy because of a toxic impairment of the labyrinth, a labyrinthitis, an organic lesion in some part of the vestibular tracts such as is produced for example by brain tumor, internal hydrocephalus, brain abscess, or multiple sclerosis; or in the presence of normal reactions we can state with assurance that the vertigo is purely functional or due to a transitory toxin.

In conclusion the following points may be emphasized:

1. There can be no vertigo unless there is a disturbance of the vestibular apparatus. When disease in remote organs is accompanied by vertigo it is because such a pathological state somehow or other affects the vestibular apparatus.
2. Vertigo may be due to simple irritation of the vestibular tracts. In such a case it is temporary and fleeting in character, leaving the apparatus itself intact, and the tests will therefore show normal responses.
3. Vertigo may be produced by a lesion of the internal ear itself.
4. Vertigo may be produced by a lesion situated within the brain along some pathway in association with the ear.
5. Disturbances of the vestibular apparatus, with vertigo, can be definitely diagnosed and differentiated by means of the ear-tests.

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GLOSSECTOMY AND LARYNGECTOMY.

Glossectomy and laryngectomy for carcinoma of the tongue and of the larynx are undertaken not merely to relieve suffering but also in the hope of effecting a cure. They are formidable operations, especially laryngectomy, and in a large percentage of cases they do not lengthen life but promptly terminate it. For this reason, and because it involves the loss of articulate speech, one is hardly justified in persuading any unwilling patient, young or old, to sacrifice his tongue or his larynx.

DEFLECTIONS OF THE NASAL SEPTUM.

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Although the etiology of deflections of the nasal septum has been the subject of constant study for many years, no hypothesis yet suggested appears to adequately explain the occurrence of the deformity in every instance. Nearly as many etiologic theories have been advanced as there are writers on the subject, some fanciful and others more or less reasonable, but as nothing would be added to existing knowledge by a complete review, only a few of the most probable causative factors will be considered in detail.

(1) Externally inflicted trauma: Experience and observation have shown that traumatism is the most frequent cause of deviation, at least so far as the cartilaginous septum is concerned; but fracture of the vomer or perpendicular ethmoid plate from a blow upon the nose seems improbable without accompanying destructive injury to surrounding tissues. The most careful anamnestic and clinical investigation may sometimes be required to establish the history of remote or even recent traumatism, the local manifestations of which may have been so trivial as to attract scant attention; yet sufficient injury may have been produced to incite later septal deviation. In fracture or dislocation of the quadrilateral cartilage, obstruction of one naris usually occurs from the convexity, the free cartilaginous border partially occluding the other; compensatory hypertrophy of the inferior turbinate will be found present in the majority of instances.

(2) Increased cranial development with consequent enlargement of the facial angle: Many observers attribute septal deflections to increased development of the osseous cranial and facial structures with consequent change in anatomic conformation. While this merely states an observed clinical fact without presentation of evidence concerning the underlying cause which produces the increased development, it seems reasonable that irregularity in size and conformation of the cranial and facial bones may result in sufficient disturbance of the nasal tissues to cause faulty position with deflection of the septum. It is well known that inordinate upward growth of the vomer is a not infrequent causative factor; the ethmoidal plate is less often responsible for the deformity.

(3) The anatomic situation and excessive development of the septum nasi: It must be remembered that anatomically the normal nasal septum occupies practically a fixed position between the unyielding frontal, ethmoid and sphenoid bones; consequently if for any reason the septum assumes greater than normal rapidity of development, thus "outgrowing" the limits of its surroundings, a deviation or "bending" is the logical and necessary outcome. A similar result may also be produced by anomalous growth of adjacent osseous structures. The reason for such developmental errors, however, is not well understood. It has been suggested that even here "trauma may be the starting point of hypernutrition with consequent deviation."

(4) Persistent high-arched palate: It has been claimed that in the majority of instances persistent high-arched palate is responsible for the production of septal deviation, the causative factor of the original deformity being rickets. The fact that in certain cases rickets and septal deflection co-exist is suggestive of such an interrelation, but positive proof is lacking. The association of high-arched palate, septal deformity and nasopharyngeal pathology is more constant, and the evidence of causal relationship consequently more convincing.

(5) Excessive turbinal development, presence of nasal neoplasms, spurs, ridges etc.: It is readily appreciable that unusual growth of the turbinal structures, the presence of enchondroses, exostoses, mucosal excrescences, neoplastic formations, etc., may induce varying degrees of septal deformity. While spurs, ridges, etc., are oftentimes found associated with deviation, there is no necessary relationship between them, as one may be present without the other. As in most other types of deviation, the cartilaginous septum is usually involved.

Strange as the observation may appear, non-traumatic septal deviation seems to be largely a product of ultra-civilization; it is unknown among animals and savages, and rare in all semi-civilized races. "The more civilized the race, the more frequently is septal deviation noted."

Numerous presumed contributing and predisposing causes have been mentioned by various authors, e. g., rickets, syphilis, tuberculosis, cretinism; neuroses, the "stigmata of degeneracy," etc., but the etiological relationship between these clinico-pathological disorders and septal deviation does not appear to have been definitely established. It is difficult of understanding why deflection of the septum nasi should occur in one individual suffering from syphilis, tuberculosis, etc., whereas a thousand others under apparently identical circumstances enjoy freedom from such deformity; and this statement is equally applicable to the majority of the other supposed predisposing causative factors. It is believed that mouth-breathing, which is prominently mentioned by textbook and other authors as a cause, usually represents one of the logi-

cal results of nasal or nasopharyngeal obstruction and has practically nothing to do with production of the deformity.

Septal deviations may assume a multitude of types, and for that reason no accurate classification can be made. Ballenger divides them into (a) cartilaginous, and (b) osseous, and gives numerous so-called varieties of each; Kyle speaks of two classes, i. e., those with and those without external deformity, also mentions characteristic "S" and "C" types; Thompson refers to cup-like deviations, saddle-shape, and several other types. "It is obvious, therefore, that while classification into groups is perhaps helpful for the purpose of study, it is useless and deceptive in practice, for there are so many irregularities and anatomical peculiarities that it would be difficult, even impossible, to form a classification which would embrace all of them."

The following types are given by Roth and have been generally recognized: (1) A thickened or deflected incisor crest on one or both sides; (2) a vertical ridge in the quadrilateral cartilage a short distance posterior to the anterior border; (3) a deflected anterior border into one nostril; (4) a general convexity of the septum on one side; (5) the entire septum may be thickened, or only the upper portion opposite the middle turbinate; (6) a vomer cartilaginous deflection, where the cartilage slides downward out of the V-shaped groove of the vomer into one or the other inferior meatus, causing almost a sharp angle and a convexity to the opposite side; (7) crest deflection with tilting of the vomer cartilaginous joint into the nares of the convexity; in this form a sharp horizontal crest on the opposite side has the appearance of a spur.

The symptoms caused by deflected septum may be local and general, subjective and objective. The influence which is sometimes exerted by nasal obstruction in the production of general symptoms seems remarkable. In marked unilateral obstruction, where the septum and turbinates are in contact, the patient may have severe headache upon the corresponding side, "post-nasal dropping," persistent cough, sneezing, etc. In addition general neuroses and reflex pains are not uncommon. If the patient be asked whether "he has ever had anything the matter with his nose," he will invariably answer in the negative. Not until patency of the nasal passage has been restored does he realize that the previously existing one-sided obstruction was the cause of his symptoms.

Among other subjective symptoms may be mentioned a sense of fulness in lower portion of the nose where the septum impinges upon the inferior turbinate; between the eyes or in the "bridge" of the nose if the deflection be high; if there is irritation of the ethmoid cells pain may be noted at the inner orbital angle and over the os unguis; in high deviation frontal headache is severe in the morning and gradually improves during the day; vertigo is a rather common manifestation, and is always intensified when the patient assumes the stooping attitude or suddenly changes his position. Because of existing anterior obstruction, the secretion collects in the lower portion of the nasal chamber resulting in the formation of scabs or crusts of heavy mucoid material which can be expelled only by forcibly "blowing the nose"; the so-called "post-nasal dropping" is usually an annoying accompaniment.

Objectively there may be observed the dislocated or fractured columnar cartilage in the vestibule; osseous ridges along the nasal floor; varying degrees of inequality in the nasal lumen depending upon the type and extent of the deviation; septal convexity is present upon one side and a corresponding concavity upon the other; there is more or less marked interference in nasal respiration, and 'mouth-breathing" is common because of partial or complete occlusion of the nasal lumen. According to Bailey, as a logical effect of the deviation there may be: (a) no symptoms whatsoever; (b) acute and chronic inflammations of the nose and accessory sinuses, or the middle ear, pharynx, and larynx, with mouth-breathing and the evils accompanying same; (c) hay fever; (d) headache and general malaise.

From the foregoing it is obvious that deflections of the septum nasi are of considerable importance to the general practitioner to whom the patient usually first applies, as well as to the specialist to whom the patient is finally referred for treatment. It must be remembered that the septal deviations observed in children seldom require treatment, nor can an instance be recalled in my practice among children where the septal deformity was not associated with high-arched palate. Deflections of the septum frequently accompany enlarged tonsils and adenoid vegetations in the nasopharynx. In the majority of such cases, while the septum may never become straight, the nasal chambers usually open as the child develops.

The observation is important that few people have normal appearing nasal septa. Taking patients as they come, with or without clinical symptoms, a straight septum is rarely seen. Associated with many deviations there are osseous ridges and spurs which also contribute to obstruction; but such nasal deformities are considered pathological

only when symptoms are thereby produced. Not all deviated septa should be operated upon.

This subject has been of great interest to me since adopting the modern operation (submucous resection) ten years ago. The operation has been performed in hundreds of cases with almost universally satisfactory results. Whenever one has the choice between surgery of the septum and of the turbinates, it is always wise to select the former. The nasal septum has no physiological function, excepting in so far as its mucous covering may be concerned. The turbinates, on the other hand, have important functions in connection with respiration. The removal of a small portion of one of the turbinates may do no damage, the remainder being sufficient to continue its function. Not many years ago complete turbinectomy was a popular procedure among certain surgeons; this resulted in the production of many so-called "dry-noses," "scab-noses," etc., the patient being left in a worse condition than before the operation.

In addition to correction or removal of the existing septal deformity, submucous resection may be advantageously employed: (a) in acute recurring nasal inflammations where the septal bulging is sufficient to impinge upon the turbinates; (b) in acute and chronic recurring inflammatory disorders of the accessory sinuses where septal deviation interferes with drainage and aeration; (c) in certain cases of nasal polypi; (d) in pharyngeal and laryngeal diseases for the purpose of relieving annoying symptoms; (e) in chronic middle ear disease with obstruction of the eustachian tubal lumen.

The following indications for operative intervention are given by Bailey, and are generally recognized by other observers: (1) In certain middle ear affections in which the use of the eustachian catheter is an essential part of the treatment; (2) as a preliminary to operations on the accessory sinuses; (3) as a preliminary to operations on the pituitary body; (4) where the septal bend impinges on the middle turbinate in such manner as to interfere with ventilation and drainage of the accessory sinuses; (5) where the deformity interferes with normal respiration and drainage through the nose; (6) in cases of hay fever in which there are hypersensitive areas of contact between the convexity of the septum and the adjacent turbinate; (7) where pressure of the septum against the nasal wall produces pain and headache.

The treatment of septal deviations is essentially surgical. If the patient has a deflection of the septum which needs correction, the suregon is not doing his whole duty by instituting a lengthy course of treatment, whether it be by sprays, general medication, cautery, or anything else excepting surgical removal of the obstructive lesion. As to the character of the operative procedure: there have been devised numerous operations having for their object the relief of the septal deviation, ranging from the old Asch procedure to many others much less severe. Many of the earlier operations were performed with the idea not of removing the obstructing tissue but correcting the deviation. And a certain percentage of cases are amenable to treatment other than resection of the septum, for instance, by the Gleason operation, or the Douglass method, etc. Modern surgeons, however, know that skilfully performed submucous resection will accomplish everything that can be done by any other operation, and is the most appropriate procedure for removing the deviating portion of the septum. Complete relief is afforded in the majority of cases, since no scar tissue is left with its dryness and tendency to scab, and since after removal of the distorted bone or cartilage there remains a functionating nasal mucosa. Of course the purpose of the operation is to place the septum in as near a straight line as may be possible, but this is almost never actually accomplished; in only the simplest forms of deviation can one approach the ideal result so far as appearance of the septum is concerned. The object is to remove as much of the cartilage and bone as necessary to restore the space which is impinged upon and thus relieve the symptoms; and this can be accomplished in the great majority of cases.

Submucous resection of the nasal septum can be classed as neither major nor minor surgery; and under most circumstances the administration of a general anesthetic is unnecessary. However, if the patient be exceedingly nervous, and sometimes in women and children, a general anesthetic is required. As a rule it is an office operation, but must be executed with accuracy and thoroughness. Some surgeons claim the operation can be properly completed within ten minutes, but experience has shown that on the average twenty to thirty minutes will be required to prepare the patient and complete the operative procedure; in some instances the time may be longer. By the modern method of applying cocaine or novocaine to the septal mucosa, the operation is rendered practically painless. No shock has occurred in any of my cases; one or two of the patients vomited after the operation, probably due to morphine and atropine which had been previously administered. The patient may be uncomfortable for twenty-four to forty-eight hours, but gradual improvement thereafter

occurs, and recovery is complete within a week or ten days.

The technic of submucous resection of the septum nasi is less difficult than those apparently unfamiliar with the operation have hitherto believed. As already intimated, a general anesthetic is rarely required. Adequate local anesthesia may be secured by applying thin pledgets of cotton saturated with either cocaine or novocaine solution, to which has been added a small quantity of adrenalin. An excellent combination consists of five grains of cocaine crystals in one fluid drachm of adrenalin solution 1:1000. By the exercise of proper care in applying the cotton pledgets, to prevent contact with the turbinates and outer nasal walls, absorption of the drug will be minimized. The adrenalin causes sufficient shrinkage of the tissues to insure adequate hemostasis, which is an important item in the procedure. In addition it has been my practice to inject under the mucous membrane of each side from one-half to one drachm of novocaine solution two per cent. with adrenalin 1:20,000. It is unnecessary to take any steps toward sterilizing the nasal cavity, the only procedure which seems wise being cleansing of the vestibule. Swabbing this space with a fifty per cent. solution of alcohol seems sufficient.

The initial incision is made vertically extending through the mucosa and perichondrium immediately in front of the anterior border of the septal convexity; these two layers are then carefully separated from the cartilage with a flat elevator, thus exposing the area to be removed; the left index finger is then placed in the other nostril and the cartilage divided with knife to the perichondrium of the opposite side. The mucosa and perichondrium over the concavity of the other side are then elevated and the cartilage or bone removed, "leaving in its place a septum consisting of mucous membrane and perichondrium, which will possess all the virtues originally intended." After approximating the mucosal borders the nostril is packed with sterile gauze, which is allowed to remain in situ for twenty-four hours when firm adhesion will have ensued. The gauze is then removed and no further packing will be required. "Properly performed under aseptic technic there should be neither complications nor sequelæ."

The principal complications to be anticipated and avoided are infection and hemorrhage. The latter need not be discussed, as it is of rare occurrence, and the usual methods for the control of nasal hemorrhage will be found efficacious. With the exercise of adequate precautionary measures infection should be prevented. The most serious sequel is sinking of the nasal bridge. This has occurred in a small proportion of reported cases, and is nearly always due to infection. As much of the septum should be removed as necessary, but sufficient solid cartilage (at least one-fourth inch) is left along the dorsum of the nose to furnish adequate support. However, where infection supervenes, this is "melted away" and sinking of the bridge is usually inevitable.

In a small percentage of cases perforation of the septum has followed the operation. Where the perforation is situated anteriorly and is small in size, the result may be a "whistling nose." When, however, the perforation is far backward, the patient experiences little or no discomfort therefrom. The appearance of the mucous membrane frequently indicates whether or not perforation need be feared. We frequently see, especially in those patients who have been in the habit of "picking" the nose, a grayish unhealthy appearing membrane on the concave side of the septum. It has been my experience in several cases of this class that perforation followed operations in which there was no departure from a perfect technic.

The question is often asked, what happens after the operation, *i. e.*, is there ever a re-formation of resection revealed a fibrous septal structure. In the nasal septum? The cartilage and bone removed are never regenerated. A few post-mortem examinations performed upon patients after submucous completing the operation the two mucous surfaces are carefully approximated and held in place by means of the packing until they become adherent. Fibrous tissue forms between these mucous layers, replacing the cartilage and bone, and producing a septum which is pliable and one which performs the function of a normal septum.

An argument which might be used against submucous resection is, what would happen if the patient sustained an injury to his nose subsequently? I am unaware of any reported cases where serious results accrued from a below on the nose after the operation, but this might be a possible objection to the procedure.

For obvious reasons the operation is contraindicated in the aged and the very young; in individuals with acute middle ear and pharyngeal lesions; in the presence of active tuberculosis, syphilis, and other grave systemic diseases.

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SEPTAL HEMORRHAGE; ITS CURE BY SUBMUCOUS ELEVATION.

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The steps of this procedure are:

1. Induction of analgeso-ischemia (this term is suggested for the state which follows the local application of cocaine and epinephrin or their substitutes, and its adoption is urged as being more comprehensive than the terms generally in use).
2. Incision and elevation of the septal muco-perichondrium backward for one inch and down to the floor of the nose.
3. Compression of the elevated membrane between the blades of a special forceps.
4. Replacement of the flap and packing in the usual manner for from twelve to twenty-four hours.

Indications for operating:

1. Cases of septal hemorrhage which resist ordinary methods of treatment, such as cauterization, astringents, etc., and those in which no bleeding point can be readily found.
2. Cases of chronic crusting of the septum accompanied by bleeding.
3. Cases of septal hemorrhage of mild or severe degree in children who will not tolerate local treatment and who are best operated upon under general anesthesia.

The principle of cure is obviously the destruction of the thin-walled, superficially placed vessels which bleed at the slightest provocation, and the ability to grasp the vessel between the blades of a forceps constitutes a distinct advantage, since pressure crushes the intima of the vessel, and obliteration of its lumen is thus accomplished.

The bleeding points are usually low down and anterior, consequently the incision should be placed as far forward as possible, and the elevation carried well down to the nasal floor.

If it is found difficult to reach with the compression forceps the vessels near the floor of the nose, a horizontal incision should be made along the floor joining the lower end of the vertical incision, or, in other words, one makes an L-shaped flap all parts of which can readily be compressed. These two incisions sever the continuity of the vessels passing through Stenson's canal, and those which pass into the mucous membrane from the maxillary crest.

Some of the vessels are of considerable size, and their anastomosis is so free that cauterization often fails to accomplish a cure.

In cases of chronic crusting accompanied by bleeding, the membrane is bound down by fibrous bands which interfere with the circulation, and cause distention of the vessels at one point and constriction at another.

When these bands are divided by the elevation the blood supply readjusts itself, becoming more nearly normal, and the general tone of the membrane is decidedly improved, with a lessened tendency toward crusting.

This improvement has been noted after the submucous resection both by me and by others, and will be referred to later.

It is easier to operate between attacks, but if other means fail one can usually check the bleeding in the following manner and operate immediately:

A pledget of gauze soaked in a 10% solution of cocaine in 1:1000 epinephrin solution is placed in the bleeding nostril while the *opposite* septal surface is painted with cocaine-epinephrin syrup (55% strength), the object being to secure a reflex vasomotor constriction of all the neighboring vessels.

If oozing still continues the bleeding side may be packed firmly with oily gauze, which will allow but little blood to escape, and while still in situ, incision and elevation underneath the packing may be carried out. Unless the case is one of marked hemophilia, no further difficulty will be encountered.

Overaction of the heart due to extreme nervousness is apt to cause continued hemorrhage, and a hypodermic of morphine and adrenalin in proper proportions will check the bleeding and quiet the patients' fears.

A good balance is 1-6 grain of morphine sulphate dissolved in 10 minims of 1:1000 solution of adrenalin. If more adrenalin is used the morphine should be increased to prevent excessive rise in blood-pressure.

Morphine dilates the medium-sized vessels, at the same time slowing the action of the heart, thus lowering general blood-pressure.

Epinephrin increases the force and frequency of the heart beat and this action added to the contraction of the peripheral vessels raises the pressure.

By giving the drugs together the desired effect of both is obtained, viz., lowered blood-pressure and contraction of all of the small bloodvessels, owing to the predominant action of the morphine.

Children and nervous adults may be given a general anesthetic if necessary and the anesthesia may be limited to the primary stage if the septum is painted with cocaine-adrenalin syrup.

Shock and bleeding are considerably lessened when local analgeso-ischemia is added to the general anesthesia.

Ligation of the bleeding vessels has been sug-

gested by some writers, but the membrane is usually so friable that such a proceeding must be attended with considerable difficulty.

A smooth flat-bladed angular forceps has proved most convenient for compressing the membrane, but an ordinary dressing forceps answers almost equally well. Care should be taken not to use sufficient pressure to cause necrosis and sloughing.

The wound edges may be brought together with sutures if one cares to spend the time upon this refinement of technic. Usually healing occurs promptly upon replacement of the flap and in the writer's series there has been no instance of perforation or other untoward result.

A convenient method of packing is with strips of oily gauze introduced in successive layers with a piece of rubber-tissue placed next to the wound.

If packed in this manner the strips may be removed in reverse order and without danger of disturbing the wound edges.

The after-treatment is that usually given resection cases, simple cleansing and protection of the wound with boric ointment or some similar preparation.

J. A. Thompson in the *Laryngoscope* of October, 1914, and Joseph Prenn in the *Boston Medical and Surgical Journal,* January 28, 1915, both cite cases of septal hemorrhage cured by submucous resection of the septum.

My experience, however, based upon 41 cases of submucous elevation with compression leads me to believe that resection of the cartilage is unnecessary unless, of course, indicated because of nasal obstruction, or for other reasons; in other words, elevation and compression of the muco-perichondrium will cure practically all cases of septal hemorrhage.

In the opinion of many rhinologists, resection of the septum should not be undertaken when the patient is less than 16 years of age, and since many of our cases of epistaxis occur in children, a method which will not interfere with septal development is preferable.

In the transactions of the 1916 meeting of the Oto-Laryngological Section of the American Medical Association, there is printed a paper by Chester C. Cott of Buffalo, entitled "Xanthosis and Other Septal Hemorrhages". The treatment is somewhat similar to the one just described, and consists of incision and elevation of the muco-perichondrium followed by the introduction of iodoform gauze which is snugly packed between the septum and the perichondrium. This is left in position for two days and replaced if bleeding follows its removal.

He reports 38 cases, all of which were ultimately cured.

The introduction of packing between the septum and elevated flap seems to us unnecessary, and the possibility of causing recurrence of the hemorrhage when the packing is removed would seem to be a disadvantage.

Most of my cases are private patients and have been seen from time to time during the past three years. The first private case was operated upon December 4th, 1913, although several cases had been previously operated upon during the earlier part of 1913 at the Vanderbilt Clinic.

All of the patients have been free from recurrence of hemorrhage except one, a woman aged 75, whose blood pressure was 230 at the time of operation. The bleeding was checked at the time, but recurred six months later. Re-operation resulted in permanent cure. The question often arises whether it is advisable to check a moderate degree of bleeding in cases of this kind. This patient insisted upon having relief from the inconvenience of repeated attacks of nose-bleed, although, probably these were merely physiological.

One of the series was a case of acute hemophilia, possibly due to pyorrhea alveolaris. The patient was a stock-broker aged 48, somewhat alcoholic and otherwise careless of hygiene, although his blood pressure was not excessively high.

Elevation and compression checked the bleeding from the anterior portion of the septum, but two days later blood appeared in the pharynx, and a bleeding point was discovered in the posterior portion of the inferior turbinate. Fresh blood also appeared in the stools and evidently came from the lower bowel. He was given several injections of human blood-serum by Dr. J. E. Welch of this city, and the hemorrhage ceased, although it was deemed advisable to keep the nose packed for about two weeks. Later on the pyorrhea was treated and up to the present time, a period of about one year there has been no recurrence of bleeding.

Several of my colleagues at the Vanderbilt Clinic have successfully used this method of treating septal hemorrhage and have been able to verify the permanence of the cure in all cases which could be followed up.

SUMMARY.

The object attained by incision and elevation of the muco-perichondrium is free surgical access to the bleeding area, and the rational treatment of a bleeding vessel is compression, causing obliteration of its lumen.

Compression *en masse* with a flat-bladed forceps

reaches all parts of the membrane and if thoroughly done results in permanent cure.

It is one of the most satisfactory methods of managing cases of septal hemorrhage in children, since the operative treatment is completed at one sitting, and no prolonged after-treatment is required.

Although the number of cases reported is comparatively small, the evidence adduced, is so favorable to this method of operation that it is confidently recommended as a routine procedure in appropriate cases.

AN INFLATABLE RUBBER BAG FOR INTRANASAL USE.*

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A strong desire to overcome the severe pain and discomfort incident to the use of gauze when used as packing in the nose led to the conception of the inflatable rubber bag.

Description: It is made trapezoidal in shape, not because of preconceived notions, but because this was the shape evolved from patterns taken from the skull. As a result the bag conforms to the shape of the nasal interior.

It will be observed that the two shorter borders, or ends, are reinforced by an extra thickness of rubber stock, so that when it is in position and inflated, there is no bulging forward out of the vestibule or backward into the postnasal space. It will also be observed that the breadth is not sufficient to reach from the floor to the roof of the nose. The result is that when in position it does not make contact with the upper third of the nasal interior. This was provided to avoid the undesirable effects of pressure in this region. The interior border is so shaped as to make accurate contact with the whole length of the floor of the nose. This is important as it helps to keep the bag in the nose, and after septal resection it keeps in place the membrane which had been elevated from the floor. The anterior border lies in the plane of the anterior bony nasal opening, and the same applies with regard to the posterior border.

In order to meet all requirements three sizes are obtainable. The arrows in the photograph show the mechanics of retention.

The tubing is long enough, three inches, to permit folding when it is tied. The method of insertion is optional. My custom has been to slip the tubing and bag over a stout nasal applicator, lubricate, and insert by carrying it back along the floor of the nose. I have also used forceps, but prefer the applicator. In doing this one must avoid puncturing the rubber. As a lubricant I use lubricating jelly rather than vaseline because the latter will rot the rubber. For inflating I use an ordinary metal ear syringe, and for tying, umbilical tape. It requires only slight distention, one being guided somewhat by the patient when not under general anesthesia. Too much pressure soon becomes painful. It is surprising how little pressure is required to stop bleeding from a small vessel, artery or vein, when the force is applied perpendicularly to the area, and continuously positive. Such continously positive pressure cannot be obtained with gauze, and besides it is never perpendicular to the surface.

A word about sterilization. Do not sterilize the bag in bichloride of mercury solution because it is impossible to get all of this off again without washing for a very long time. The corrosive action of the mercury bichloride is almost certain to occur. It is better to boil in saline solution for at least three minutes just before using.

Uses: (1) As a splint; (2) For the control of hemorrhage.

Splint: Fractures of the nasal septum, when seen soon after the injury, may be replaced by means of the bag. In such cases the bag is inserted in the side toward which the displacement took place, and then it is suddenly and forcibly inflated with air. The suddenly distended bag produces pressure on that side of the septum in a direction perpendicular to its surface, with the result that the septum is suddenly replaced to its former position. There is frequently at the instant of replacement an audible crepitus. This crepitus is, of course, not heard if there are soft tissues caught in the line of fracture. As this procedure is very painful a general anesthetic should be administered. The bag should remain in the nose from 24 to 72 hours

*Presented before the Section on Laryngology and Rhinology, New York Academy of Medicine, November 22, 1916.

under very moderate distention, when it may be removed and left out. One patient whom the writer did not expect to see again had this work done without an anesthetic, and the bag immediately removed. Subsequent information disclosed the fact that nasal breathing was not obstructed on either side and it was assumed that the septum remained in the corrected position.

The most frequent call for the use of the bag as a splint is after the submucous resection of the septum. It is here that it displays its great advantages over gauze; these are, ease of insertion, freedom from pain if the distention is not too great, ability to vary the pressure without disturbing its position in the nose, the comparatively short time it is permitted to remain in the nose, ease of removal, and the comparatively slight bleeding at the time of removal.

Ease of insertion: By this is meant the ease with which the operator can make the insertion of the deflated and lubricated bag, and the absence of the slightest discomfort to the cocainized nose, the bag automatically assuming the correct position.

Freedom from pain: This applies not only to the absence of pain during the act of inserting, but also to the absence of pain during the time the inflated bag is in the nose. Here, another word of caution about putting in too much pressure.

Ability to vary the pressure: Should the pressure be too great it may be easily reduced without disturbing the bag in the nose.

Time it is permitted to remain: After submucous operation, from 6 to 12 hours; my custom has been to remove after 6 hours, as a result of which early removal the patient spends a more comfortable night with a certain amount of nasal breathing. Drainage from the sinuses is thus not interfered with except from the swelling of intranasal structures incident to and following the operation. In some cases there is a little oozing when the pressure is released. Allow the deflated bag to remain *in situ* for 5 or 10 minutes, after which it may be removed. In the event of severer bleeding it would be very simple to reinflate, and permit the bag to remain several hours longer; or, one bag might be removed, and the other, the one on the side the incision was made, left in under slight distention. Obviously, after this operation a bag is inserted in each side, and the bags equally inflated.

Ease of removal: By this is meant absence of pain to the patient, and the ease with which the operator is able to extract the bag. Mechanically it is similar to the exit of the shoulders of the child in an obstetrical case, i. e., anterior or upper shoulder first.

The use of the bag is indicated after my operation on the nasal septum where some form of splint is desired to hold the parts in position, or to prevent bleeding. In this connection may be mentioned submucous removal of spurs, and plastic operation for correction of septal perforation.

For control of hemorrhage: It is understood that when, as described above, the bag is used as a splint it is also working as a control of hemorrhage. The two functions are accomplished at the same time. The trauma to the nasal mucous membrane is, in my hands, much less than that produced by gauze or any other form of splint or packing that I have ever used. With the correct pressure it is negligible.

A frequent use for the bag will be found in cases of spontaneous epistaxis regardless of cause. In these cases it is the easiest and most certain means of control that can be used, and will be greatly appreciated by the general practitioner. It is as certain with arterial as with venous hemorrhage. The most frequent site from which epistaxis occurs is Kiesselbach's space on the anterior part of the septum. In those cases where there is bleeding simultaneously from both sides the bags are a great comfort, as one may be inserted in each side, and all bleeding stopped. In these cases it is dangerous, on account of the possibility of producing perforation, to perform any kind of cauterization or operation on both sides at the same time, and we have heretofore been compelled to pack at least one side. The bag should be left in the nose from 12 to 24 hours, over night. In several cases I have removed it after 6 hours, and in one case after 3 hours, without recurrence of bleeding in any case. In cases of epistaxis on adults with high blood pressure the use of the bag should be governed by blood pressure and hemoglobin readings. I allow myself to be governed by three considerations, viz., clinical symptoms, hemoglobin and blood pressure readings. I do not insert bags until the blood pressure has been markedly reduced, or unless there is threatening syncope from loss of blood. Having had no hemophyliacs to treat is is impossible for me to make a statement as to its efficiacy in these cases.

It has been my experience in cases where the bleeding is coming from an artery, that is is impossible to stop it by any method of cauterization. The usual result of the attempt is an increased bleeding. It is my custom to cauterize the spot with the galvano-cautery as quickly as possible, and immediately insert a bag. This is permitted to remain in the nose over night. On removing it the next morn-

ing a well cauterized area will be disclosed, and usually no further cauterization will be required.

44 CENTRE AVENUE.

TUBERCULOUS MASTOIDITIS: RADICAL OPERATION UNDER COCAIN ANESTHESIA.*

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About two years ago, Mr. S., age 24, consulted me about his deafness and sharp pain in the right ear. He had had a tuberculosis of the lungs which at the time of examination, was in a quiescent state. He had had a radical mastoid operation performed on the left ear and mastoid four years before. This had never healed properly with the result that there was a large opening in the mastoid cavity, constantly suppurating, which lead down to exposed dura.

The right side showed granulations in the middle ear, entire destruction of the drum and the discharge of cheesy pus. Culture from this ear and from the sinus behind the left ear, showed numerous tubercle bacilli. The patient could hear neither watch nor tuning fork at either ear.

During that first winter, I had him under observation two or three times a week, during which time I attempted by every known means to clear up the condition. Cleanliness, stimulation and injection of mixed vaccines did little good. In the summer of 1915, his health deteriorated so greatly that he had to leave for the West. Last spring I received a message that his right ear and mastoid were paining him greatly and so I had him return to New York for further observation.

Examination at this time showed no material difference in the ears except that the process in the right ear seemed more advanced. I advised a radical mastoid operation.

The question of anesthesia was an important one. Here was a patient with a quiescent tuberculous process in his lungs, whose general physical condition was far below par. Ether narcosis would possibly light up his lung condition. I determined to operate upon him under local anesthesia.

On the day of the operation, at ten o'clock in the morning he was given a hypodermatic injection of morphin gr. 1/4, atropin gr. 1/100. Two hours later, a second injection of like amount was given. At two o'clock he was brought to the operating room. As there were no signs of opium poisoning, another injection of morphin, gr. 1/8 was given. The operative field was prepared in the usual manner. An injection of a solution of cocain, 10 per cent, with equal parts of adrenalin, was made along the line of the proposed incision, going well into the surrounding tissues, forward to the lobe of the ear, upward to the zygoma and backward to the occipital bone. An attempt was made to have the injections reach down to the periosteum. This is not a difficult matter in this region as the tissues are not very thick.

The semilunar incision was made throughout its whole extent down to the periosteum. A longer needle was attached to the hypodermatic syringe and an injection made under the periosteum of a 1/2 of one per cent cocain solution with equal parts of adrenalin (Shleich infiltration). Two or three drams of this solution were injected, care being taken that some of it reached the periosteum below the tip and anterior to the bony canal. It was spread through the tissues posteriorly and above until an area of at least three to four square inches was infiltrated.

The periosteum was then incised and scraped back with a raspatory. The retractors were inserted. Let me say here that a great deal of pain may be caused by sharp retractors which dig into tissues not anesthetized. Dull retractors may be used: but where definite areas of pain are found, it is better to inject more cocain.

After the bone was well exposed, the mastoid cavity was uncapped with a chisel. The patient complained of no pain at any time while I was working in the mastoid cavity. It is unnecessary for me to go into the details of the operation—a Schwartze-Stacke—except to say that the cavity was extremely large, the bone extremely hard, and the tip entirely destroyed so that it had to be removed in its entirety. When I asked the patient to describe his sensations to me, he stated that he felt no pain, only the apprehension of pain similar to what he would feel in the dentist's chair. We are wont to feel that in the mastoid operation under ether anesthesia, the constant chiseling and use of rongeurs produces a slight concussion of the brain which accounts for the lessened amount of ether we have to give. After this experience I am inclined to think that this notion is untenable. The constant pounding of the bone produced no marked change in the patient's mental condition. In fact he did not seem to mind it at all.

The mastoid cavity was thoroughly cleaned out without any trouble. The bony canal wall and the bridge over the antrum were removed without any pain. But when the sensitive mucous membrane of the middle ear was reached, trouble commenced. We had been unable thus far to cocainize this membrane. Here was a mass of sensitive granulation tissue. In order to overcome this sensitiveness I injected a four per cent. cocain solution along the posterior canal wall, into the granulations themselves and deep down into the Eustachian tube. Not all sensitiveness could be overcome but enough to proceed with the operation with little trouble. The mass of granulations were removed with a curette until I came to a thicker, tougher mass apparently attached to the internal wall of the middle ear. I hesitated to remove this as I realized that the facial nerve was either in it or close by. But the mass was infected and had to be removed. I grasped it with forceps and snipped it off with small scissors. At once the patient exclaimed "You must have hit my facial nerve. The right side of my face is paralyzed." Such was the fact.

* Presented at the Otological Section, New York Academy of Medicine, October 13, 1916.

I curetted out the Eustachian tube and easily made a skin flap for a new canal. The making of the skin flap was facilitated by the lack of bleeding, due to the blocking off of the vessels by the cocain solution. When one realizes how much bleeding there usually is, he can understand the value of this ischemia. After making the artificial canal, the posterior wound was closed with tendon sutures.

Three hours after the operation the patient sat up in bed to eat his supper. Having had a radical mastoid operation performed on the other ear under ether anesthesia he was in a position to make comparisons. He was most enthusiastically in favor of local anesthesia. Not only had the general reaction been severe at the time of the former operation but his wound pained him a great deal. In this instance, the pain was practically nil. At the end of the week he left the hospital with his wound in excellent condition. The facial paralysis began to improve so, evidently, the nerve was not completely severed.

A few months ago I lost track of the patient. But the other day I received a letter stating that he had died at Bellevue Hospital during the summer from a tuberculous meningitis. Autopsy showed a direct extension of tuberculosis from the suppurating cavity behind the left ear (the first one operated upon) to the dura.

The practical points to be deduced from this case are the following:

1. That the radical mastoid operation can be done under local anesthesia without any pain.

2. That the superficial scalp tissues and periosteum are sensitive, but that bone has absolutely no sensation.

3. That the mucosa of the middle ear is extremely sensitive and must be separately cocainized.

4. That irritation or destruction of the facial nerve is immediately noticable to the patient.

5. That the immediate after-effects of the operation are practically nil.

6. That the end-result is just as good under local as general anesthesia.

11 WEST 81ST ST.

TONSILLECTOMY FOR ATHRITIS.

Years ago it was the tonsils; when these were removed the arteriosclerosis would be relieved, the rheumatism cured, the arthritis deformans checked. Now we know that the tonsils may be organs of elimination of bacteria and toxins as well as foci of infection and that their indiscriminate removal is not to be advised. As good a man and experienced an observer as the clinical professor of pathology in one of our largest medical schools states that the worst cases of chronic rheumatism and its sequelæ he has seen, have occurred in individuals who had had their tonsils removed in youth; and he unqualifiedly condemns this procedure as lessening one's immunity to infection.—MARTIN J. SYNNOTT in the *Medical Record.*

NOTES ON THE SURGERY OF FOREIGN BODIES IN THE INTERIOR OF THE EYE.

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In order to set forth the surgical management of foreign bodies in the interior of the eye, I cite what I conceive to be three illustrative cases, two of magnetic foreign bodies and one of a non-magnetic. Of the first two, the attempted extraction was attended by success in one, by failure in the other; it was also a failure in the third. In all, however, the results may be said to have been excellent from a surgical standpoint.

CASE I. On April 2 I saw L. N., 38 years of age, a baker, who was referred to me by Dr. H. W. Inglin of Freehold, N. J. About a month before I saw him, while hammering a metal hoop on a barrel, he was struck in the right eye by a small piece of metal which he assumed came from either the hammer or the hoop. He did not suffer a great deal of pain nor was his eye much inflamed afterward, but his sight became rapidly dim in that eye and when I saw him a month after the accident his lens was almost entirely opaque and he could see only movement of the hands in front of the face. The eyeball was but slightly pink and was painless, nor was there any pain on pressure. The diagnosis was made of probable metallic foreign body in the interior of the eye, and this was rendered more likely by the existence of a small scar on the cornea a little upwards and outwards, although there was no injury, as far as could be seen, to the iris. In order to make certain the patient was referred to Dr. George T. Dixon, who made roentgenograms and plotted out the position of the foreign body. The foreign body had apparently passed through the cornea, and into the lens in which it was caught, and remained sticking, a portion of it projecting into the vitreous humor, while the rear end, a little blunter than the anterior, remained caught in the substance of the lens back of the equator. The question at once arose, whether it was wise to attempt to remove it.

In view of the well-established fact that foreign bodies remaining in the lens produce but little irritation and rarely set up destructive inflammation of the eye, I was inclined, at first, to leave the eye alone, but in the nature of things a foreign body in any location should, if possible, be removed. In addition, the patient desired it to be removed, and people in general object to having things located in their anatomy which do not belong there. As long as the man's other eye was sound and he had no pain in the injured eye, the temptation to withhold my hand was strong. Nevertheless, I felt myself compelled to proceed by the formula and in accordance with accepted doctrine. To that end he was sent to the hospital and prepared for operation. Cocaine was used because the cooperation of the patient is necessary in the pro-

cedure of extracting foreign bodies from the interior of the eye.

The eye having been cocainized and the non-magnetic speculum introduced, the patient being in a sitting posture on a table, the sterilized apex of Haab's giant magnet was brought almost in contact with the cornea, when the iris was seen to bulge slightly downward and inward. In a few seconds, the foreign body leaped up from behind the iris and lay flat against the back of the cornea. The magnet was then removed, on the assumption that the splinter of steel or iron would drop to the bottom of the anterior chamber; singularly enough, however, instead of doing so, it jumped back behind the iris and disappeared. Although the pupil was quite widely dilated with atropin it could not be seen. The procedure was repeated and three times the steel leaped back and out of sight. A section was then made with a lance-shaped knife below and a small iridectomy was performed. The magnet having been applied to the open wound the foreign body was brought directly into view, but it did not come out. Johnson's magnet was now used and the curved tip being introduced into the lips of the wound, it was easily extracted.

The patient recovered from the operation in surprisingly short time, the wound healed by first intention, and within a week the eye was not even pink. The cataract was rendered a little more dense, and of course the patient was dissatisfied because he couldn't see—although it had been explained to him beforehand that the operation was not done for the purpose of giving sight. The eye has remained quiet ever since. It was then explained that the cataract could be removed and he could be made to see with that eye, but he had had enough and was content to ply his trade with one eye. The foreign body was about 4 mm. long and 1.5 mm. broad; one end was sharper than the other.

A different procedure might have been employed in this case, viz., the removal of the cataractous lens and the foreign body with it, but since the foreign body was sticking into the vitreous and only about one-half of it was caught in the lens, I feared that, in removal, the lens might come away and the foreign body remain. This probably would have happened in the ordinary method of extraction, that is, the extraction without the capsule. The Indian operation, or extraction with the capsule, alone would have been indicated here. It is unlikely that even that would have succeeded completely, first, because the operation is difficult to perform, and second, because the eye having already received a certain injury, the healing might have been delayed or prevented by the original trauma, for it is well recognized that preceding trauma lowers the vitality of tissues in general.

As the matter now stands, the lens can be extracted by section below with ease and probably with complete success.

On the whole, I believe the case has been conducted along the safest lines, and though the patient takes great satisfaction in demonstrating the foreign body to friends, he is thoroughly discontented, which, however, is nothing unusual.

CASE II. A man of 18, on May 17, 1916, was struck in the right eye by a portion of a Remington cartridge which rebounded from a disc of steel at which one of his comrades was firing. There were three young men present. The first fired at the metal disc at a distance of five feet, and next to him on his right, stood another. My patient, fearful of being hit, got behind the two and in the rear of a radiator through which he looked at the performance. When the shot was fired something struck him in the right eye which must have passed between the head of the firer and the man on the right and through one of the interstices betwen the convolutions of the radiator. After all his precautions, he was struck and the other two escaped!

I saw the patient the next day. There was in the cornea a ragged wound running from near the center downward and inward to the edge of the cornea, extending slightly into the sclera. The lens was milky and disorganized. The iris was caught in the lips of the wound and drawn to the edge of the cornea. The anterior chamber was evacuated and the rest of the iris lay against the back of the cornea. The eye was but slightly pink and was painless, which is usual after extensive and severe injury to the cornea when it is perforated, whether the wound be lacerated or clean-cut. He had no fear of light and came with his eye unbandaged. After hearing the history I thought it probable there was a foreign body in the interior of the eye, but what the nature of it was was something of a problem. The Remington cartridge consists of lead, steel, and one or two other metals in small proportion. If the foreign body was steel or any other magnetic metal the chance of removing it by a magnet existed; if not, I quickly made up my mind not to attempt to remove it. I explained the situation to the parents, stating that the patient had one of three or four chances of the foreign body being magnetic, and that I thought we should give him the chance of removing it in that way, although it was slight. His eye therefore was subjected to the giant magnet, but as there was no movement whatever of the iris when the point of the magnet was laid against the cornea, and the same maneuver failed after several attempts, I decided the foreign body was probably non-magnetic and more likely lead than anything else.

Before the attempt the patient was sent to the hospital for roentgenograms, but owing to his moving his head during the taking of the picture the foreign body could not be definitely located. Nevertheless, the roentgenographer informed me that there was certainly a foreign body in the eye. Hence, I applied the magnet as soon as possible.

The magnet having failed, I attempted a clean iridectomy by making a section at the corneal margin, but owing to the anterior chamber being eliminated, it was difficult to grasp the iris as neatly as I wished, and so had to content myself with removing small bits, opening the corneal wound, cutting away the threads of iris caught there, and syringing out the anterior chamber with normal saline solution. A drop each of argyrol and atropin solutions were instilled and the patient put to bed.

The eye healed with great rapidity and the patient was without any pain whatsoever throughout the healing. In six to eight weeks the lens had become completely absorbed; the corneal wound had healed so that there was almost no scar except at the edge. The pupil was pear-shaped, running downwards and inwards. Owing to the rapidity of the healing, I assumed a mistake had been made in locating the foreign body and had another picture made. I believed the body had passed through the eyeball completely and was located behind the eye in the orbit, but the second roentgenogram made by Dr. Dixon disclosed a foreign body hanging in the vitreous just in front of the optic nerve. Dr. Dixon estimated the size of the metal as about 2 by 3 mm., and requested me to examine the eye critically under atropin. This having been done, the foreign body was seen clearly in the vitreous humor just about where he had located it. From its appearance, I assume it was encysted and from its non-irritating character I assumed it to be lead. This was more likely than that it was any other metal, for I have ever found lead is borne more kindly in the interior of the eye than any other foreign body except glass. Fortunately, the posterior capsule had a rent through which, under correction, the patient was able to see 20-30 plus. The extraordinary thing is that it lodged exactly where it did, went no further, and became encysted. It must have entered the eye very hot, hence aseptic. To these facts I attribute the quiet condition of the eye following the trauma and the operation, the absence of vitreous cloudiness around the foreign body and the good sight. I do not believe it will migrate after the manner of copper and I think the boy will have a quiet eye as long as it stays where it is. The patient works at his trade as high-class mechanic, the eye is quite painless, and the difference in vision of the two eyes does not annoy him. I have counseled against his using correcting glasses as I have rarely found glasses borne with comfort when the lens has been lost in one eye.

It is difficult to imagine a happier outcome of any case. In my opinion the fortunate result was due partly to the aseptic character of the foreign body, which was lead probably, and to the fact that the operation was quickly done after the injury, and that all shreads of iris were freed from the lips of the wound, and that the anterior chamber was thoroughly irrigated with normal saline solution.

CASE III. M. W., a man of 63, was struck in the left eye by a small piece of steel on January 10, 1916. He did not go to the hospital until ten days before he was seen by me, which was on the third day of March. I found a slight scar on the cornea upwards and inwards and a very small hole in the iris corresponding. These were the only signs of external injury. The lens was completely cataractous and swollen. The eye was painless and white. He said it hurt a little when he used the other eye. The right eye was normal with normal vision. Roentgenograms had been made on February 28th, and a small foreign body was found practically in the same location as was found afterwards on May 11, 1916, when the case was in my hands. When first seen the case was in the hands of Dr. Lambert of the New York Eye and Ear Infirmary. The roentgenograms taken on May 11th, after the operative attempt to remove it, show a slight change in the position of the foreign body.

It was questionable in view of the quiet condition of the eye, when I first saw the man, whether it was advisable to attempt to remove the foreign body, both because the eye was so quiet and because the foreign body was so small. The patient was certain it was a piece of steel, and following the formula in such cases I attempted to extract it by means of the magnet. A few days after I had seen him, he was subjected to the giant magnet at the hospital, when it was distinctly observed by both my assistant and me that the iris bulged forward when the magnet was applied, but the foreign body could not be brought into the anterior chamber. As it lay to the nasal side of the vertical meridian an iridectomy was performed at that point in the hope that the body had become entangled in the iris and might be removed when the iridectomy was done or be extracted by means of the magnet. The piece of iris, when cut away, was examined carefully without any sign of the body being found. It did not appear either when the giant magnet was laid at the lips of the wound nor when the tip of Johnson's magnet was inserted between the lips. I caught a glimpse of what I conceived to be a minute foreign body on the upper inner quadrant of the surface of the lens, but I was unable to grasp it by forceps nor did it attach itself to the point of the magnet. I therefore concluded it was a piece of iris pigment. These manipulations naturally ripened the cataract and caused the lens to swell, although the wound healed rapidly. At the end of about a week the eye was intensely red, there was marked iritis, the lens completely filled the anterior chamber and the tension had increased to plus three.

The temptation to remove the lens by section was very great. The difficulties of achieving this were obvious, on account of the swollen lens. Moreover, I reflected that the eye had been subjected to trauma once by the accident and again by the operation. In the face of authority, I decided to withhold my hands. From this time until May 30th, the tension varied, the iritis receded and reappeared, from time to time, until I became almost desperate and again was tempted to oper-

ate. Just after May 30th I thought I detected a slight shrinking at the edge of the lens just in front of the iris, which had in a measure become constricted behind the lens—the latter filling the anterior chamber. I regarded this as a favorable sign and thought the lens would rapidly absorb. By way of a prediction, I stated in my notes there would be complete absorption of the lens within a month. Within a month from that date, the lens had completely absorbed with the exception of a small chalky lump in the inner side. Nevertheless, from time to time, there was a recurrent iritis with alternate increase and decrease of tension. Finally the eye became white and quiet.

At first I was unable to get more than 20-200 with correction. On September 5th, however, the patient had 20-40 plus with 13, no stigmatism being evident. Through a rent in the capsule, the background of the eye could be seen and the retina and optic nerve appeared to be normal. The small chalky deposit referred to remained, but was out of the line of vision. The patient had hyperopia of plus 1 on the right, and with plus 13 for his left, he saw for distance and reading with comfort. He was completely satisfied, contrary to the rule, and pursues his former business without any trouble in vision, or any pain, from the use of his eyes.

The position of the foreign body, as shown on May 11th, was a little different from that shown on February 28th. This may have been due to the effect of the magnet or may have been due to difference in the calculation of the roentgenographer. It is approximately where it was in the beginning, which is to say, at the point where the cornea emerges into the sclera. The tissues at this point, as well known, are very tough and I do not doubt that it had become so intimately attached to them that the magnet could not draw it away. That the iris was bulged forward when the magnet was applied can certainly be vouched for by my assistant and myself. I believe the foreign body will cause no further injury to the eye, and that its position will not alter with time. The question now arises as to whether it was wise to have attempted its removal. Might it not have been better, in view of the quiet condition of the eye, to have simply extracted the cataract? While this might have been better, no one knows it, and we can only point to the result as most fortunate and satisfactory. The satisfaction I get out of the case is first, the bald result, second, what I conceived to be the delicacy with which the indications were met during the rise of tension and the iritis, and third, my resistance to the strong temptation to operate a second time.

A great impetus has been given to the study of these cases by the invention within the last ten years of the giant magnet. The credit for this is due to Haab. With the power of thirty ampères the pull of the magnet is about thirty pounds to the square inch sectional area when the object is situated about one inch from the apex of the magnet. This, of course, is based on the assumption that the foreign body is in the background of the eye and on the recognized fact that the eye in general, is about nine-tenths of an inch long.

Antecedent to the invention of this magnet a number of hand magnets had been constructed, the tips of which were ordinarily thrust into the wound of entrance. Several delicate instruments called sideroscopes have been constructed, based upon magnetic attraction, by means of which the presence of magnetic foreign bodies in the interior of the eye can be recognized. There was, however, no power to locate the position of foreign bodies in the eye inherent in these inventions. To Pooley, unquestionably, the credit for constructing the first sideroscope is due. This invention gave inspiration to other observers which resulted in the Haab giant magnet and a number of powerful hand magnets, of which latter, in my opinion, the Johnson magent is the best. But success in removing foreign bodies from the interior of the eye is dependent not only upon the knowledge of the pulling power of the given magnet but largely also upon the localization of the foreign body by means of the roentgen-ray. As can be seen by the charts attached to this article, localization can be done with the utmost accuracy. An error of no more than one to two mm. may be counted on.

A number of men throughout the country have acquired great skill in the localization of interocular foreign bodies, and to them most of us send our patients. It is bootless to go into the history of this matter any further.

When we reflect that 75 per cent. of foreign bodies in the interior of the eye are magnetic, we recognize the great advance which has been made in this direction in the surgery of the eye. The other bodies which are found with less frequency are stone, wood, glass, lead and copper. The last is becoming more and more infrequent, the further we get away from the days of the percussion cap. In an experience of thirty-four years, for example, I have never had a case of copper in the interior of the eye.

It seems that the irritating quality of foreign bodies is dependent in the first place upon their nature, and second, upon whether they are septic or aseptic. Copper, for example, is known to be very irritating whether septic or aseptic, and according to distinguished authority it is given to migrating from place to place in the interior of the

eye. Lead is quite frequently found and my experience with it has been rather exceptional. Iron and steel are irritating by reason of the fact that they become oxidized, I think. Glass and lead I have found the least irritating and most surgeons probably hold the same opinion. I have known a shot to remain imbedded in the retina for twenty years, while the patient preserved good sight, although the eye was irritable under excessive use.

Whether the foreign body is septic or aseptic is the most important point to be considered. Septic foreign bodies as a matter of course are likely to set up inflammation, suppurative or plastic, whereas an septic object will irritate an eye simply on account of its natural quality, like copper, or on account of its presence alone. I think most pieces of metal that fly into the eye are not septic because they usually are the result of an explosion, or a blow produced by one hard body striking on another and either the heat of the explosion or the force of the blow produces enough heat to render the body aseptic. Such is the case particularly with glass when it enters the eye through an explosion. Moreover, glass, on account of its smoothness, is less likely to carry microbes than a rougher material.

The point of entrance of the foreign body is a matter of the utmost importance. Those that enter through the cornea, becoming entangled in the iris, or that fall to the bottom of the anterior chamber, are of least importance and are readily extracted by means of an iridectomy alone or in combination with a magnet. Those that enter the lens and remain there can frequently be extracted by removal of the lens, and if not in that way, in case they are magnetic, by means of a magnet. In my first case, that of the foreign body in the lens, I considered it bad to attempt to remove the lens because the point of the foreign body was projecting into the vitreous and I feared it might remain in the posterior capsule, or if it came away with the lens, might get entangled in the lip of the wound and fall back into the interior of the eye. I think it safe to say that the nearer the foreign body is to the ciliary region, the more likely it is to produce inflammation and destruction of the eye and the more likely it is to produce interference to add to the irritation caused by it.

Foreign bodies suspended in the vitreous, which remain fixed and become encysted, as a rule do not give much trouble, unless with time the vitreous becomes liquid, when they splash about in it and thus disorganize the vitreous and produce general irritation and inflammation. When they enter the retina and remain in the interior of the eye, involving the choroid, they sometimes remain quiet, but it is exceptional and they should always be regarded with suspicion and treated as insidious enemies.

Of course, the degree of the loss of sight in these cases depends on the general condition of the eye, the position of the foreign body with reference to the yellow spot, opacities of the cornea, and the condition of the lens. The prognosis is best in the case of magnetic foreign bodies. Attempts to remove them should always be made with the giant magnet or the hand magnet or both, and the next most important question, and it may be described as a burning one, is the point at which the eye should be attacked by the surgeon. Some surgeons, and I am inclined to think the majority, believe that the bodies should be drawn into the anterior chamber by applying the magnet to the cornea. If the foreign body is behind the lens it will have to make quite a trip to arrive at the anterior chamber. It cannot be pulled through the lens unless it is loosely attached to it, so without a doubt its path is through the ligament of Zinn. It must travel with considerable speed and hence it must cause considerable irritation. In case, however, it is not slender, but is more or less irregular or triangular in shape, it is difficult to pull it into the anterior chamber, and whether the attempt is successful or not, under these circumstances, irritation must be caused. The chance of the eye to recover is in inverse proportion to the irritation caused by manipulation. Hence it would appear best to open the sclera in such cases and so draw the body out through the shortest route possible.

As stated, the nearer the foreign body is to the ciliary region, the greater the irritation and the greater must be the irritation caused by attack. As a corollary, when the foreign body is situated further back toward the rear of the eye the irritation is less. In general terms, however, I think it best to attempt to remove the foreign body through the point of entrance, if that is posterior to the cornea, or by drawing it into the anterior chamber, if it enters through the cornea. The success of this manipulation, that is the removal through the wound of entrance, depends also decidedly on the time when it is attempted. Foreign bodies should be removed in twenty-four to forty-eight hours after the accident, when the chances for success are greatest. The longer the time they remain, the less the chances for success and the greater the danger of the ultimate loss of the eye. The shape of the foreign body should be determined by the *x*-ray before the operator decides on the point of attack. If it is slender it is best to

draw it into the anterior chamber because one point will precede the other and the ligament can thus be easily pierced. Sometimes the slender body turns with its long axis at a right angle to the lips of the wound and lodges there. Under such circumstances it is best to manipulate it with forceps so as to make one pole present towards the lips, and then to use the hand magnet.

I think this statement can be laid down as an axiom: *It matters not how fortunate the results may be in any case or how soon after the accident a successful extraction is made, the future of an eye into which a foreign body has penetrated is always problematical.* It is difficult to cite any reliable statistics in this matter and the time has not yet come when they should be made up. In fifteen to twenty years they may be compiled and some definite conclusions drawn, but for the present, the guarded statement just made holds good, I believe.

When a non-magnetic body has passed through the lens and lies anywhere posterior to that structure, the safest thing is to leave it alone. If it happens to be lead or glass, according to my experience the chances for the eye are better than in the case of other substances, but the safety lies in its becoming encysted and remaining fixed in its position. In both my cases of magnetic foreign bodies, attempts to remove them were made after months because there was but little irritation and their position was such as led me to believe they could be extracted with good results. As to the third case, the non-magnetic foreign body, I was convinced when the eye behaved so well and recovered so rapidly that the body consisted of hot lead and that it had passed clean through the eye and lodged in the orbit, but, as seen, it had become encysted in the vitreous and I believe that fact together with the asepsis of the body accounts for the eye remaining quiet. As long as it remains fixed, I believe the eye will be safe, but prophecy is a dangerous thing.

In conclusion, it can be said that the invention of the giant magnet and the perfection of the hand magnet have created an epoch in the surgery of magnetic foreign bodies in the interior of the eye. The surgical management of non-magnetic foreign bodies in the interior of the eye remains approximately what it was before.

To search for a focal infection as the cause of neuritides and obscure arthritides is scientific and therefore commendable; but to rob such patients of their tonsils or teeth without very satisfactory indications is perverting scientific zeal to unscientific enthusiasm.

THE OPERATIVE TREATMENT OF STRABISMUS.*

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The operative treatment of strabismus in children resolves itself, for all practical purposes, into the treatment of the concomitant, or non-paralytic variety, and, in what follows, I shall restrict myself to the consideration of this type.

Paralytic strabismus is exceedingly rare in children for the obvious reason that its most common cause, acquired syphilis, is hardly ever present, and it is only with the utmost rarity that hereditary syphilis produces paralysis of an ocular muscle.

Concomitant or non-paralytic strabismus presents itself under two forms, convergent and divergent, of which the former is by far the more common. In regard to the surgical procedures to be employed for their relief, opinion has differed greatly in the past, and it cannot be said that the subject is definitely settled now. Still, there exists unquestionably more agreement today than there was even fifteen years ago, and the almost invariable operative procedure of the past, tenotomy of the muscle or muscles believed to be in a state of spasm has been to a large extent replaced by, or combined with, operations designed to strengthen the action of the muscles believed to be weakened by disuse.

In the surgical treatment of the convergent variety, we have the choice of one of three operative procedures, tenotomy of one or both interni, advancement of both externi, or the shortening or advancement of the externus of the deviating eye combined with tenotomy of its internus. My own experience, in uncomplicated cases, has been almost entirely restricted to the first and second methods, and in choosing one or the other, I think we should be guided by certain circumstances of the individual case. I think it is true that an advancement of both externi to the corneal margin, in so far as the permanency of the result and the possibility of restoring binocular vision are concerned, is the operation of preference, but a rather extensive experience with its use has convinced me that it may at times be advantageously abandoned in favor of tenotomies. When the squinting eye possesses very little vision, is in a high degree amblyopic, no operative procedure can obtain anything but a cosmetic result, no operation can be relied upon to produce a permanent cure, and it seems to me rather useless to subject the patient to the inconveniences of

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advancements, or the surgeon to the difficulties of their performance. In such cases, I think a tenotomy of one or both interni just sufficing to under-correct the deviation is, all things considered, the better procedure. The great disadvantage of this method is that gradual divergence will subsequently ensue, but, in the cases mentioned, ultimate divergence will probably follow any method, and if we under-correct the deviation, it is possible to maintain a good cosmetic result for years by the proper employment of glasses.

Again, when the eyes are rather deep set, advancements are difficult to perform, and their cosmetic effect is far from pleasing. After a tenotomy, an eye protrudes slightly; after an advancement, it slightly recedes and, in the cases mentioned, the ultimate result of advancement of both externi is that an expression of cunning is produced, for which even the re-establishment of binocular vision will be found not to compensate the parents, particularly if the patient happens to be a girl. Another disadvantage of advancements is that they leave behind them, for a considerable period, a yellowish discoloration at the site of operation.

When, then, ought we to employ advancements, instead of tenotomies?

In answer to this question, I would reply when the vision of the squinting eye is fairly good, when the eyes are fairly prominent, and when the parents do not object to the patient's confinement to the hospital for a week. In such circumstances, I believe that an advancement of both externi will procure better and more lasting results than any other method. In performing tenotomies of the interni, we must be guided by the amount of effect desired and must so grade our efforts that a slight degree of squint shall remain uncorrected. This is sometimes difficult to do, but, as a rule, such a result can ultimately be obtained. In advancements, our results do not depend upon the degree of deviation present. In all cases, the externi should be advanced to the corneal margin, whether the squint be one of ten, twenty or thirty degrees, and the absence of any fear of an over-correction is a great comfort to the operator.

On the other hand, the technic of a tenotomy is simple, while that of a thorough advancement is complicated. The former can generally be performed, even in children, under cocaine, while the latter, when performed upon both eyes at the same time, always necessitates a general anesthetic. The after-treatment of tenotomies amounts to nothing, while a double advancement requires attention for a week. Nevertheless, advancement of both externi unaccompanied by tenotomies is greatly to be preferred, in my opinion, in suitable cases.

The surgical treatment of divergent strabismus is more complicated than that of the convergent variety and should depend entirely upon the character of the muscular anomaly that is causative. I do not think that this thesis has been sufficiently promulgated. The surgeon who invariably performs one variety of operation upon his cases of divergent strabismus, will meet with an unnecessarily large number of unsatisfactory results. Another point that should be emphasized, although somewhat without the scope of this paper, is that while glasses should always be prescribed in convergent cases, and by their employment cures without resort to operative measures may frequently be accomplished, they are of no curative value whatever in a very large class of those of the divergent type. Cases of divergent strabismus can for the greater part be divided into two great classes, those associated with myopia and those associated with hypermetropia. In the first class, the underlying muscular error is usually an insufficiency of converging power and concave lenses should always be employed before resorting to operation. In the second class, however, the muscular anomaly is almost invariably an excess of diverging power and convex lenses are of no service in aiding in the correction of the deviation.

In regard to operative measures, when the squint is associated with myopia and insufficiency of converging power, advancement of both interni is the proper procedure, and is invariably followed by good results. When the deviation is associated with hypermetropia and an excess of diverging power, a free tenotomy of the externi, repeated if necessary, will be equally successful. In the first class of cases, tenotomies of the externi, and in the second class, advancements of the interni will always result in failure.

It would seem from these statements that the operative treatment of divergent strabismus ought always to be successful, and so I think it is in the two classes described which constitute the greater number of our cases. Unfortunately, there still remains for consideration a group in which the refractive and muscular errors are neither so clearly defined nor so distinctly associated.

Thus we find cases in which one eye is hypermetropic and the other myopic, and others in which the muscular anomaly is a combination of an insufficiency of converging power and an excess of diverging power. In these we cannot so accurately prognosticate the result of our operative measures. When one eye is myopic and the other hyper-

metropic, the prescription of glasses is usually of no value and, in operating, I think we should always attack first the muscular error that is the more prominent. If we are finally compelled to add a tenotomy to our advancements, or an advancement to our tenotomies, we must expect that we shall sometimes produce an over-effect. A slight over-correction of divergent strabismus is not, however, as disastrous as an over-correction of convergent strabismus, for while a slight convergent squint is hardly discernible, a slight divergent squint is a noticeable deformity.

DIFFICULTIES IN THE DIAGNOSIS OF MONOCULAR OPTIC NEURITIS.

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Every ophthalmologist has been puzzled and worried by the above condition and the advantage of a routine procedure in the investigation has made itself manifest to me after several perplexing situations. It is not within the scope of this paper to endeavor to set forth every possible cause of optic neuritis, but to call attention the more important etiological factors in the production of this pathological entity.

These causes may be divided into three main branches: *constitutional, focal* and *local.*

The *constitutional* conditions are those which are, however, more prone to produce bilateral than unilateral inflammations. Under this head we find syphilis, tuberculosis, nephritis, diabetes and leukemia. Since the discovery of focal infections I believe that rheumatism may be excluded from this group.

The *local* causes predominate in the monocular type. Long before Onodi brought forth his classic work upon the relations of the accessory sinuses to the orbit, Prof. Hirschberg of Berlin impressed upon me the fact that sinusitis was the first thing to suspect after making a diagnosis of unilateral optic neuritis. The ethmoids and sphenoids are more often affected, but I have seen cases where the maxillary and frontals were at fault. This form of accessory sinus disease has been described by so many authors that it is hardly necessary to dwell upon the manner in which the inflammation is carried.

The cerebral variety from meningitis and tumors must be borne in mind.

By *focal* infections I refer to the transmission of toxins or bacteria through the blood current, from a distinct diseased area. Only recently, after failure to relieve a neuritis by other measures, the removal of tonsils caused a rapid improvement. Several investigators have found peridental infections of tooth roots to be another of the prominent sources. Old latent gonorrhea has produced the disease of the nerve, as demonstrated by Reber and his results.

Besides these causative factors, injuries to the orbit with deep cellular inflammation, tumors of the optic nerve and its surrounding area may produce the neuritis.

Now the difficulty in determining the cause is the main trouble in diagnosis, for any ophthalmoscopist will note the pathological lesion; but his responsibility does not end here. I personally endeavor to follow a fixed routine so as not to overlook a possible feature.

Bearing in mind the principle cause, I have roentgenograms made of the sinuses, and also at the same time of the teeth. Of course a careful perimetric test with a campimeter to trace any enlargement of the blind spot is a fixed order. (I need not dwell upon the fact that an enlargement of the Mariotte spot is an early feature of sinus optic neuritis.) If these are negative, a Wasserman test together with a Hecht-Weinberg test and a urinalysis are demanded. This is followed by a complete physical and neurological examination by a competent specialist. In case these proceedings have been unsuccessful, the tonsils are explored for possible pus cavities, and if found, the offending parts are extirpated. A complement fixation test may assist, but of this I am rather doubtful.

And now a last resort in undiscovered causes is to have a rhinologist explore the sphenoids and ethmoids by direct puncture. To demonstrate the efficacy of this I append a rather complete report of an obscure case with a most gratifying result.

F. J. B. was referred to me by an optician on June 7, 1915, because of poor sight in the right eye. The patient was a well-developed, fairly nourished male, 27 years of age. He also complained of a frontal headache on the right side.

Under homatropin cycloplegia his retinoscopy was

$$\begin{array}{ll} +1.0 & +0.75 \\ \hline +1.9 & +0.75 \end{array}$$

V. O. D.+1.0 sph. 6-18—6-12.
V. O. S.+0.75 sph. 6-4.

The right disk was swollen about 2D with indistinct outline; the veins were dilated and somewhat tortuous. The periphery was normal as was the left fundus. Pupillary reaction was perfect. Blind spot enlarged, but test not accurate.

Diagnosis—Optic neuritis O. D.

Examination of the urine was negative.

Referred to Dr. Sidney Lange for a radiogram of sinuses and teeth.

June 9, 1915, Dr. Lange reported as follows:

"The plates of Mr. B. turned out entirely negative. The ethmoids and antra appear fairly clear, although over the right antrum there is increase in density indicating that there has been some thickening of the wall here, probably from a previous infection, but there is no evidence that the right antrum is filled with pus now. The frontal sinuses are quite small and on the right side there is scarcely any frontal sinus to be seen. There seems to be an abortive frontal as a result of anatomical variation. The side view of the skull is negative showing no abnormality about the sella turcica or base of the skull."

V. O. D. 6-60. Disk elevation 3D. Referred to Dr. W. C. Harris for nasal examination, who found:

"The nasal mucous membrane presented a gelatinous appearance, reddish pink in color and uniformly swollen. The turbinate tissue could be only slightly indented by pressure with probe. There was a complete absence of polypoid degeneration, no abnormal secretion. Air cell in left middle turbinated bone considerably dilated. The septum deviated to the right, causing partial stenosis. Posterior rhinoscopic examination shows hypertrophy of lower bone ends. Naso-pharyngeal wall thickened and dry."

The patient was next referred for complete neurological survey to Dr. Wm. Ravine, who reported that everything was negative except a small scar on the penis, possibly from a chancre. Wassermann reaction negative.

June 17, 1915. No longer central fixation. Disk height remains the same, but the vessels more tortuous. Patient has been getting mercury inunctions and KI internally.

July 18, 1915. At my request Dr. Harris opened the ethmoids and sphenoid on the right side and reported as follows:

"Operation. Under cocaine and epinephrin anesthesia the right antrum was first explored but no pus was found. After removal of the right middle turbinated bone a number of small cells and a single large cell were exposed from which pus oozed, foul-smelling and greenish in color. A fine probe introduced high up near the ostium sphenoidale met little or no resistance, and with a crackling noise readily entered the sphenoidal sinus. A curette was then introduced and withdrawn several times, bringing away pus and dead bone. All adjacent cells were then scraped and the opening was enlarged downward and laterally. Wound loosely packed with a strip of gauze and warm sterile vaseline. There was very little bleeding. Patient did not complain of pain during operation, but experienced relief from a severe pressure in head. Ten days after operation nose was free from pus."

July 6, 1915. Vision O. D. 6-36. Disk not elevated and the border shows distinctly upon the nasal side. My next notation is May 29, 1916: Vision 6-12 with faint central scotoma for colors. Temporal half of disk very pale. Sharply outlined. No trace of exudate. Vessels normal.

SPECIFIC EPIPEPHYCITIS (TRACHOMA).

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No apology is offered for anything contained in this paper which may appear hypercritical or in conflict with prevailing ideas expressed in current text-books and elsewhere; nor does an excuse appear necessary for the foregoing superscription to represent the contagious conjunctival disorder hitherto almost universally known and erroneously designated as trachoma, "granulated lids," Egyptian ophthalmia, granular conjunctivitis, and several other equally ambiguous and inexact terms.

It seems a strange commentary that the majority of lexicographers and medical writers have overlooked the following pertinent facts: (a) that literally trachoma can mean only something which is rough, (b) that the term does not, even inferentially, indicate the eye, the conjunctiva, or any other anatomic structure, (c) that the most liberal interpretation of the word conveys not the slightest etiologic nor pathologic hint. Obviously, therefore, trachoma is unscientific, totally inaccurate, a rank misnomer, and should be eliminated from the nomenclature. Granulated lids is incorrect, since the eyelid is not divided into grains. Egyptian ophthalmia is inexact, because: (a) there is no tangible evidence that the disease originated in Egypt, and (b) the word ophthalmia cannot be justified under any circumstances. Oculus or ophthalmus plus infection and inflammation would necessarily be oculitis or ophthalmitis. Granular conjunctivitis appears less objectionable, since it indicates inflammation and definitely locates the anatomic structure implicated, yet it fails to convey the least etiologic indication.

Inasmuch as "epipephycitis" is the correct term to represent conjunctival inflammation,* the designation "specific epipephycitis" seems anatomically, pathologically, technically, and scientifically exact.

*[Introduced by Achilles Rose.—Ed.]

That the determining etiologic factor of the inflammatory lesions remains unknown, cannot be legitimately imposed as an objection to the term. The disease certainly owes its origin to a specific bacterial agent, although thus far it has eluded isolation.

As is true concerning the majority of other so-called microbic affections, the date and geographic location of the initial appearance of the disease under consideration cannot be definitely stated. There is reason for believing, however, that "contagious sore eyes" are coincidental with the history of mankind. Excellent descriptions of the malady are found in the oldest available medical literature. Contrary to the usual belief that the disease was transported to Europe by the returning army of Napoleon after his invasion of Egypt, it was shown by subsequent investigations that centuries previously "contagious sore eyes" had been endemic in the former country.

The disease has undoubtedly always prevailed in America. There is historical evidence that the aborigines were familiar with its ravages. It is said that of the three hundred and twenty-three thousand Indians remaining, fully sixty-five thousand are infected, the majority of these being in Oklahoma; and that in the same state twenty to forty per cent. of white school children are similarly afflicted. In Kentucky alone it is estimated there are 33,000 cases. Of 18,016 individuals actually examined prior to 1916, seven per cent. were infected. In the remote mountain regions between twelve and twenty-five per cent. of the population suffer from the malady, and during 1915 over twelve thousand cases were treated in five special hospitals in Kentucky, Virginia and West Virginia. The disease also prevails to a greater or less extent in nearly every other state in the union. "Among 192,788 white and colored persons examined to April 30, 1915, there were found 3,619 cases of trachoma; and among 39,231 Indians examined to December 30, 1912, there were 8,940 cases" (Kerr). During seventeen years (1897-1914) inspection of 11,966,897 arriving aliens revealed 22,984 cases of specific epipephycitis. King examined 4,000 children in the Porto Rican schools, finding 9.5 per cent. infected, and classed 5.4 per cent. more as suspicious. He thought the "general average of 9.5 per cent. a fairly accurate index of the amount of infection in the schools throughout the island, which would mean that of an enrollment of 182,766 pupils during the past school year (1914), 17,435 have 'trachoma,' to say nothing of 10,000 more classed as suspicious; truly, a distressing situation!" Clark's estimate is 8.5 in every thousand eye infections; that it is responsible for 18 per cent. of the blindness in Russia; that one thousand cases per year are treated in the Lemberg Hospital; that in Posen and Silesia the disease is very prevalent; that in Japan of 400,000 recruits 23 per cent. were infected; that about 23 per cent. of western Indians and 13 per cent. of those in Virginia have the disease. Only nineteen cases in Negroes were found in a thousand examinations; the Negro has been protected in the past only by his lack of opportunity to contract it (Clark).

As already intimated, notwithstanding the extensive microscopic and bacteriologic investigations which have for years been in progress, the essential etiologic factor of specific epipephycitis remains undiscovered; and while it may seem useless to indulge in purely speculative hypotheses, a brief résumé of existing information may be permissible.

Since the causative agent has thus far defied isolation, certain observers attempt to maintain the obviously fallacious contention that the disease does not owe its origin to a specific contagium, that it simply represents conjunctival reaction "under certain circumstances" to invasion of the bacillus Egyptiacus or other "well-known microorganisms." The "certain cirmumstances" inducing conjunctival reaction in one instance and not in ten thousand others under apparently identical conditions has not been explained. One might with equal propriety disclaim the existence of pathology induced by the ubiquitous diplococcus of Neisser as to deny the specific origin of the disorder under consideration. Other writers contend that specific epipephycitis and folliculosis are identical, the various gradations in virulency being attributable to secondary microbic invasion.

The clinical observation is undisputed that many varieties of bacteria have been isolated from conjunctival excretions during even mild attacks of ordinary so-called non-specific, catarrhal, irritative and follicular conjunctivitis, but it is emphatically denied that the granular or specific type of the disease was ever produced by the invasion of such micro-organisms. Therefore the theory of "etiologic unity" advanced by Axenfeld seems without tangible scientific foundation.

Considerable importance was originally attached to the so-called "inclusion bodies" discovered by Halberstadter and Prowaczek, but since the exact nature of these bodies and their etiologic relationship (if any) remain undetermined, their presence or absence has no practical significance. Moreover, inclusion bodies not dissimilar in any essential respect have been discovered upon normal and abnormal mucosal surfaces in situations anatom-

ically remote from the ocular apparatus, and their presence has been found inconstant even in clinically positive specific cases. This observation is equally applicable to other varieties of so-called inclusion bodies described by Lindner and his coworkers. While successful cultures of these bodies have been made by Noguchi and Cohen, no etiologic importance can be attached to their experimentations inasmuch as the "cultivated bodies" proved non-pathogenic. Whether in nature these inclusion bodies are bacterial, parasitic, or the result of metamorphotic cellular changes, and likewise whether they have a possible etiologic relationship to specific epipephycitis, are still among the unsolved scientific problems.

Present etiologic information may be thus summarized: (a) specific epipephycitis is a contagious disorder, the essential etiologic factor of which has thus far defied isolation; (b) dissemination of the disease is favored by unhygienic and insanitary surroundings among those uneducated in the economic importance of personal cleanliness; (c) common towels, handkerchiefs, etc., are most prolific sources of contagion.

Little need be said concerning the pathology and diagnosis. After inoculation there may be expected conjunctival papillary hypertrophy, irritation and redness, followed by granulation. With the inflammatory hyperplasia there is always increased vascularization. As the lymphoid cells proliferate, the follicles degenerate and usually become encapsulated by connective tissue; hyperplasia and disintegration continue, the capsule ruptures, discharges its contents, and cicatrization occurs. The pathology may thus rapidly or gradually progress until the greater portion of the conjunctiva is destroyed, with obliteration of the blood vessels, atrophy, and formation of cicatricial tissue.

While the disease is classified as acute and chronic, it is usually insidious in its development, the so-called acute stage may escape notice, the pathology being far advanced when the patient is first observed. Bilateral involvement is the rule, but there are many curious exceptions. The disease has been encountered in both extremes of life, and blindness is oftentimes the logical and inevitable result in untreated and neglected cases.

Owing to the similarity between the lesions of specific epipephycitis and folliculosis, differential diagnosis may be difficult without prolonged observation of the patient. However, the tendency of the latter disease is toward resolution, whereas without exception in the former there is rapid or gradual progression. Rapidly developing inflammatory granular lesions may cause intense suffering; conjunctival irritation, lachrymation, photophobia and pain are the most prominent clinical manifestations. In early cases the diagnosis must be based upon these symptoms together with the presence of characteristic "sago-grain" appearance of the conjunctivæ. In the later stages the diagnosis is readily apparent to the initiated.

The most important feature in connection with developed pathology in any anatomic situation is determination of the method by which its removal may be accomplished with least danger to the host. There has been much debate concerning the treatment of so-called trachoma, and many methods of procedure have been devised. As the scope of this paper does not include prophylaxis, extended consideration cannot be accorded that feature. The remark may be permitted, however, that in every instance the disease is preventable by the exercise of proper care.

General medicinal treatment of contagious eye diseases, in so far as the expression may relate to the internal administration of drugs, is a delusion and unworthy of serious consideration. Regardless of the period in the history of the affection when the patient is first observed, remedial measures to be effective must be locally applied, and should be classified as surgical.

The primary therapeutic objects to be remembered are: (a) to minimize conjunctival edema and hypertrophy, (b) to accomplish removal of existing granular lesions, (c) to obviate destruction of the conjunctiva, (d) to prevent complications and sequelæ endangering corneal integrity, (e) to restore normal functionating capacity of the damaged tissues, and (f) to prevent deformity and future visual impairment.

Much of the therapeutic advice given in textbooks seems absurd to present-day ophthalmic surgeons. Inasmuch as the patient, except in rare instances, does not apply for treatment until the disease has already exhibited evidences of chronicity —extensive conjunctival edema with abundant excretion, intense photophobia, pain, etc.—it is the height of folly to temporize with minor local measures which do not contemplate immediate removal of the conjunctival lesions. The mild lotions usually recommended are of value only for their local cleansing and antiseptic effects. It has been my experience that solutions of mercuric bichloride and other drugs as ordinarily applied are harmful rather than beneficial, although the so-called "intense bichloride rub" may sometimes be advantageously employed. This method is strongly advocated by Beals, who says "one of the most pleasing

features of this treatment is that no scar tissue results." The technical details of his procedure will be described later. The local employment of caustics and ointments, such as copper sulphate, silver nitrate, copper citrate, tannic glyceride, alum, zinc, mercury, etc., has for the most part been found unsuccessful, although some of these agents may be distinctly useful in lessening excretion and promoting healing after surgical destruction of the granular conjunctival tissue has been accomplished.

It is my opinion that conservative surgical operations, such as digital or instrumental expression of the granular masses, grattage, curettement, scarification, or combinations of these procedures, should be given preference over more radical methods. The plan best suited to the individual case can be determined only by careful examination.

Thorough expression by means of the thumb and forefinger under local anesthesia has been found an admirable method of treatment, or if preferred the roller forceps of Knapp, the expressor of Kuhnt, the oval forceps of Noyes, or other suitable instrument may be used.

Incision followed by grattage is believed by many operators to be a more rational surgical procedure than simple expression as ordinarily employed, since the granulations and underlying lymphoid tissue may be thereby more thoroughly destroyed and cure hastened. This operation should be performed under general anesthesia, and the globe must be properly protected to prevent its being injured during the "scrubbing" process. A sufficient number of conjunctival incisions (about 2 mm. apart) are made with a sharp scalpel at right angles to the lid margin, after which the tissues are "scrubbed" with a stiff brush or the gauze-covered finger of the operator, until the surface becomes comparatively smooth.

Removal of the granulations and hypertrophied tissue by means of a small sharp curette under general anesthesia may be sucessfully accomplished, but as the procedure entails greater danger than expression or incision and grattage, in my judgment the latter operations are to be preferred. Curettement can be no more effective than grattage, the technic is difficult, the operation is tedious, and the danger of inflicting serious injury to blood vessels infinitely greater.

Light scarification followed by either digital or instrumental expression is popular with certain operators. It is claimed that the method is superior to incision and grattage, because the danger of damage to the underlying healthy tissue is minimized. It is more effective than expression without scarification, because of the facility with which the granulations are removed. The technic is simple, but a general anesthetic is necessary for its satisfactory completion. I believe this is one of the most effective methods of treatment yet devised, and in the majority of instances should be the operation of choice.

Beals' "intensive bichloride rub" may be executed under local anesthesia, and his technic is briefly as follows: Instil one drop of a ten per cent. solution cocaine into the eye, three times, at five-minute intervals, then wait for fifteen minutes. Use a cotton applicator of steel with large wooden handle, the shaft being three-sided to facilitate twisting the cotton pledget into a hard roll the diameter of which should be the size of an ordinary lead pencil. The cotton pledget should extend well beyond the round and smooth end of the shaft. The cotton is dipped in 1-1,000 mercuric bichloride solution. The patient sits in front of the operator with the head tilted backward, is directed to look toward the cheek, and to keep the eyelids relaxed. With the left hand gently grasp the upper eyelashes and raise the lid from the globe; with the right hand pass the cotton pledget underneath the lid; release the lashes and, grasping the handle of the instrument with the right hand, pass the cotton slowly but firmly from side to side; at the same time putting the lid gently on the stretch by lifting the probe away from the globe. As the probe passes from side to side it is rotated, especially at the inner and outer angles. The patient is directed to turn the eye upward and a similar procedure is pursued with the lower lid.

Destruction of the implicated tissues by means of the galvano-cautery is merely mentioned to suggest its inapplicability. During the period when electricity was recommended and extensively utilized in the treatment of various internal and external lesions, this method enjoyed some popularity. So far as can be ascertained, it has now been practically abandoned.

Radical excision of the tarsal cartilage and palpebral conjunctiva according to the technic originally suggested by Heisrath and Kuhnt, or some modification thereof, is now being quite generally employed. For instance, in a recent article White and White refer to over four hundred patients treated according to this plan. "The efficacy of this operation seems to be known to but few. Radical removal of the pathological tissue is unconvincing to many men, but when an apparently hopeless case of blindness of long standing grows worse under every other form of treatment, and

immediate improvement is noted after this operation so that soon the patient is able to earn a livelihood, it seems as though everyone must be convinced" (White and White).

Although in my private practice such radical surgery has been found unnecessary in the treatment of this affection, my results having been satisfactory from less heroic measures, it is well understood that circumstances might arise making radical excison of the cartilage and conjunctiva advisable. For instance, in aggravated long-standing cases with great lid deformity the excision operation has a distinct field of usefulness. During my service in one of the large ophthalmic hospitals of New York several patients were subjected to this procedure with satisfactory results.

The following excerpt of White's technic is presented merely as a matter of surgical interest: After proper preparation of the patient the lid is everted and the margin grasped by fixation forceps and incised. The method of incision is important, as failure of correct placing may mean post-operative deformity. One should begin in the center and extend the incision with sharp scalpel through the subareolar tissue. A mattress suture is placed in the center of the ocular conjunctiva and dissection continued until the outer and inner canthi are reached. Dissection at the outer and inner canthi should be left until the last, as bleeding from arteries at these points may be profuse. Hemorrhage is controlled by hot compresses, mosquito hemostats, and adrenalin. After introducing mattress sutures at the outer and inner canthi the cartilage is excised. A wide thin rubber horn introduced between the conjunctival flap and the posterior surface of the tarsal cartilage protects the globe. Excison is commenced with scalpel and completed with curved scissors, the muscle and tissue being dissected from the inner surface, and the cartilage removed in its entirety. Proper placing of the sutures is an important step. The first suture is inserted in the center through the transverse fold; the second thread of the double suture is then passed through the strip of cartilage left at the peripheral margin of the lid at the same vertical point as the first. Other sutures as required are placed in like manner. The sutures are tied over sanitary cigarette drains extending from inner to outer canthus, or upon rolled cotton asepticized with ten per cent. argyrol solution. The stitches are removed the third day, or sooner if necessary, and the external lid surface dusted with sterile powder (White).

One of the most important indications in post-operative management is the application of ice-bags. In some instances hot compresses seem more effective in reducing pain and promoting comfort. In either event the applications must be changed with sufficient frequency to maintain a fairly even degree of cold or heat. Irrigations are contraindicated excepting to remove the debris immediately following the operative procedure. Ointments containing copper, mercury or other suitable drug may be gently applied as required to lessen excretion and promote healing. Applications of heat and cold may be discontinued after twenty-four hours unless pain continues severe.

This paper would be incomplete without mention of the two latest therapeutic measures that have been advised in the treatment of so-called trachoma, although I have had no personal experience with either, viz., vaccine and radiotherapy. In a recent article Lowenstein and Hermann claim to have been experimenting with such vaccine therapy for ten years. A portion of their paper is quoted for what it may be worth: "Only the crude disease product could be used for the production of antigens. Cases were selected which presented 'trachoma granules.' These were expressed, the instrument cleansed, and the granules 'rubbed up' in a mortar with saline infusion and injected, without further elaboration, beneath the skin. No reaction followed, not even allergy. Eight or ten days after injection the disease began to improve, and in three weeks more the lesions had cicatrized. In certain cases 'trachomatous' pannus, when present, disappeared and the cornea 'cleared up.' The return of vision was remarkable."

Writing on the "radiotherapy of trachoma," Rossler states that for some time he has been applying the Finsen method of treatment to "trachomatous eyes," incited thereto by Groenholm's report of unusual success with this method. The author states that seventeen or twenty-one cases thus "finsenized" were cured or materially improved, and in only four did the affection continue a progressive course. The mild uncomplicated cases were the ones most benefited. Rossler claims that "he never witnessed such prompt and permanent cures under any other measures."

The foregoing citations from recent literature emphasize the fact, well-known to ophthalmic surgeons, that while no single method of procedure yet devised has proven entirely satisfactory in the treatment of specific epipephycitis, the disease is curable with preservation of visual function in practically every case provided the patient be seen sufficiently early. However, where the disease has been permitted to progress unchecked and blindness has already ensued from corneal implication,

there is no method known by which vision may be restored. Even in such cases, however, it may be possible to promote physical comfort of the patient by surgical correction of existing deformities.

To describe in detail the various complications and deforming sequelæ, and discuss the methods of treatment applicable to each, would prolong this paper beyond reasonable limits.

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THE SELECTION OF SURGEONS BY THE HOSPITAL.

In the selection of a surgeon, trustees may be unduly impressed by popularity. A surgeon rarely acquires a large clientele unless he is competent to operate, but the most popular surgeon is not always entitled to hospital preferment. A surgeon whose private practice is so large as to exhaust his time and energy cannot be expected to be punctual in attendance on the wards, or to be deliberate, careful and thorough in examining ward patients. This is the type of surgeon who sees his patient for the first time in the operating room, and who is content to leave diagnosis and other preliminaries in the hands of the house staff. Such a surgeon may be entirely willing to give his best service to the hospital, but he is not in a position to do so. The function of the hospital is a dual one—first, to care for its patients, and, secondly, to contribute to the advancement of medicine. No hospital may rightly neglect either of these functions. A surgeon who is so preoccupied by private practice that he cannot interest himself in research work, cannot train his assistants, and cannot cooperate freely with the laboratory staff, is one whom the hospital can afford to pass by.—S. S. GOLDWATER, in *The Modern Hospital.*

In cases of unaccountable fever, especially in children, never fail to examine the ear.

A PIECE OF LEAD PENCIL IN THE ORBIT ONE YEAR: A CASE REPORT.*

JOSEPH BRUDER, M.D.,
NEW YORK CITY.

H. G., aged six years, was brought to my office on the 28th day of December, 1916, with the following history:

He fell on his face one year ago, causing redness and swelling of the right upper lid and the right globe; the mother also noticed that there was a slight drooping of the lid.

The family physician treated the boy for a period of about six months, at the end of which time he incised the so-called swelling, stating that an abscess had formed. The swelling persisted, however, and the wound refused to heal. The mother then took the child to several other physicians, who also incised the wound, but without success.

When seen by me, there was a swelling at the upper and inner margin of the orbit, the size of a hazel-nut, which had an appearance not unlike that of a sebaceous-cyst; there was also slight divergence of the right eye.

I made a tentative diagnosis of a foreign body in the orbit.

The following morning, under general anesthesia, I cut down into the abscess, and with a probe I detected a foreign body, which proved to be a piece of lead pencil, about three-quarters of an inch in length, imbedded obliquely in the antero-posterior diameter of the orbit.

Within a few days after the removal of the pencil, the swelling disappeared and the wound healed.

* Presented before the Ophthalmological Section of the New York Academy of Medicine, January 15, 1917.

THE NEW OPHTHALMOLOGICAL SERVICE AT BELLEVUE HOSPITAL.

A unique ophthalmic service of fifty beds has just been opened in Bellevue Hospital, New York. It is located in the new surgical pavilion, but is a separate unit, with its own attending and resident staffs, nurses, operating, examining and dressing rooms. Dr. Charles H. May is director of the service and Drs. Julius Wolff and John M. Wheeler are his principal assistants.

The parotid lymph glands are not uncommonly the seat of tuberculous infection, and when there are no cervical node involvements to suggest the diagnosis the chronic swelling is often mistaken for a parotid tumor.

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WALTER M. BRICKNER, M.D., F.A.C.S., Editor

NEW YORK, MARCH, 1917.

THE SIGNIFICANCE OF COUGH OF SUDDEN ONSET.

It is an accepted and deplorable fact that physicians are leaning more and more on the crutch of laboratory findings and losing or, which amounts to the same thing, not using their clinical sense. With the disinclination to use and to sharpen their powers of observation comes the neglect of careful histories. Without any spirit of harsh criticism we would mention this matter in order to point out that there are in every physician's experience instances where a careful history taken when the patient first came under observation might have avoided a fatal termination.

In this connection attention is called to the onset of cough, especially a sudden onset in an individual previously well. Within the past six months there have come under our observation and notice several cases of foreign bodies in the air passages and in the esophagus in which the parents—because these patients are almost invariably children, and children often too young to be questioned—gave no more information than that the child was ill with a cough. The diagnoses were made in each of these cases by a careful and painstaking history.

In every child the sudden onset of cough is a symptom of deepest significance. In some instances the parent will know the moment that the first paroxym began. Usually, in foreign body cases, there is a sudden paroxysm, often with dyspnea and cyanosis which after a few moments passes off. This may be followed at shorter or longer intervals by other paroxysms or there may be further cough of slight or marked severity but not paroxysmal. The cough is often relieved by the patient's lying down, perhaps in one certain position. Any movement or change in position may bring on a return of the coughing. There is no fever or expectoration, at least at first, and there may be no physical signs of lung involvement. The parent may volunteer the information that the child was eating at the time of the first paroxysm. A history such as this can often be elicited by a little questioning and then the diagnosis is plain. Roentgenography is of very little value, for unfortunately very many of the foreign bodies inhaled in this way do not cast shadows. A shadow, however, clinches the diagnosis and a roentgen examination should always be made, for it will serve to definitely locate a certain number of foreign bodies. A negative picture makes an early bronchoscopic examination all the more imperative, for food particles disintegrate in the bronchus and then are extremely difficult to remove in their entirety.

The consequences of retained foreign bodies of soft consistency are very serious. Pneumonia follows, as a rule, and chronic fibrous processes may be set up, or the breaking down of lung tissue and abscess, formation, or dilatation of the bronchi and bronchiectatic cavitation may ensue.

A history of this sort is pathognomonic. Yet in a recent case three different medical men ignored these facts as of no consequence and so impressed the parents that a fourth doctor who was called because the child was growing worse was not told this history. He was unable to make a diagnosis on the physical findings and asked for a consultation. The pediatrist, an experienced and able man, by careful questioning again elicited the history of cough of sudden onset and bronchoscopy removed the foreign body, a piece of nut, after an interval of three weeks. This child died of bronchopneumonia.

Another recent instance was that of a metallic foreign body—a collar button—which perforated the esophagus after having been lodged therein for over four weeks. This child had been taken to the pediatric clinic of one of our hospitals. Despite careful questioning, the mother denied the possibility of a foreign body's presence. Four weeks later there was a massive hemorrhage from the mouth and the fluoroscope revealed the collar button. The child was in extremis when admitted to the hospital and died with the button unremoved.

Valuable time is lost and comparatively simple conditions with practically no mortality turned into indubitably fatal ones by neglect of these niceties of observation. When patients with unaccountable cough—with or without dyspnea and expectoration and with few or unexplainable physical signs are submitted to early bronchoscopy—which in expert hands is harmless—deaths from foreign bodies in the air passages will be reduced to a minimum. —L. G. KAEMPFER.

Surgical Suggestions

A suction device to keep the air passages clear of blood is of the greatest importance in all operations under general anesthesia within the mouth or pharynx. Its employment will obviate aspiration pneumonia and pulmonary abscess.

A careful examination of the ears, the teeth and the accessory sinuses of the nose may reveal the cause of a long-standing trifacial neuralgia.

The practice of performing tonsillectomy, adenoidectomy and submucous resection of the nasal septum in the office, is a risky one and should be condemned. These are not trifling procedures, they are not free from danger; and the patient is entitled to the proper environment for their performance and after-care.

Intermittent swelling of the submaxillary (salivary) or parotid gland, usually with discomfort when eating, is very suggestive of a stone in Wharton's or Steno's duct. Stricture of Stenos' duct will produce the same symptoms, (i. e., a simple stenos-is) without stone.

Frontal sinusitis, with pain, tenderness, fever and even slight swelling for several days may yet recover without operation; on the other hand, frontal sinusitis too long neglected may develop osteomyelitis of the frontal bone or brain abscess.

Pediculosis capitis with pain, tenderness and swelling of the mastoid region has often been mistaken for mastoiditis; so has a furuncle in the auditory canal.

It is in the aged individual, with healthy children and grandchildren, who apparently has never had evidences of syphilis, that one is most apt to be led astray by some late manifestation of the disease.

Book Reviews

Diseases of Occupation and Vocational Hygiene. Edited by GEORGE M. KOBER, M. D., L. L. D., Washington, D. C., and WILLIAM C. HANSON, M. D., Belmont, Mass. Large octavo; 875 pages; illustrated. Philadelphia; P. BLAKISTON'S SON & CO., 1916. Price $8.00.

Books upon occupational diseases are by no means scarce, but there is at present no single volume dealing so fully and authoritatively with occupational diseases and vocational hygiene as this new volume produced under the editorship of Kober and Hanson. The contributing editors, with the exception of three, are all American, whose personal interest in the subject and public service have made them competent authorities to discuss the particular themes appearing under their names.

The general content of the book covers: Part 1,, Specific and Systemic Diseases of Occupation, Fatigue, and Neuroses; Part 2, Etiology and Prophylaxis of Occupational Diseases and Vocational Hygiene; Part 3, The Relation of Clinics, Statistics, Governmental Study and Legislation to Occupational Diseases.

The subject matter under these three heads are variously diversified and no single author is responsible for the elaboration of the text for more than a few chapters. In the writing of the volume there have participated physicians, teachers, legislators, legal experts, insurance examiners, statisticians, clinicians,, physiologists, sociologists, and public health officials. The points of view thus diversified contribute to the superior value of this work as a source of information for employers labor organizations, physicians, legislators, and public health officials.

The general scope of the subject has been so thoroughly covered that the book merits consideration and study by those seeking or needing a convenient and authoritative guide to study ooccupational diseases and vocational hygiene.

Preventive Medicine and Hygiene. By MILTON J. ROSENAU, Professor of Preventive Medicine and Hygiene, Harvard University; Director of the School for Health Officers of Harvard University and the Massachusetts Institute of Technology. With Chapters upon Sewage and Garbage, by GEORGE C. WHIPPLE, Professor of Sanitary Engineering, Harvard University; Vital Statistics, by JOHN W. TRASK, Assistant Surgeon-General, U. S. Public Health Service; MENTAL HYGIENE, by THOMAS W. SALMON, Medical Director, National Committee for Mental Hygiene. *Second Edition,* Thoroughly Revised. Large octavo; 1209 +76 pages. New York and London: D. APPLETON & Co., 1916.

The rapid strides made in advancing the science of preventive medicine and hygiene have called forth a second edition of Rosenau's excellent treatise. The broad field of science forming the foundation of public health work has been greatly enriched by the addition of much new material. Numerous new subjects have been added. Many chapters have been rewritten, and one section on Military Hygiene has been added, while the chapter dealing with Mental Diseases has been recast and widened in scope under the general title Mental Hygiene.

It is unnecessary to review the various sections on the Prevention of the Communicable Diseases, Immunity, Heredity and Eugenics, Foods, Soil, Water, Sewage Disposal, Refuse Disposal, Vital Statistics, ındustrial Hygiene and Diseases of Occupation, Schools, Disinfection, and Military Hygiene. It is sufficient to say that it represents the most useful single volume accessible to students of medicine or public health.

The general text-book form has not been altered, so that moot discussions do not fill up unnecessary space. The references at the conclusion of each section suffice to indicate the authorities consulted in the development of the text, and afford an opportunity for those, particularly interested in definite subjects, to continue their researches in books specifically devoted to such subjects.

The text, printing and illustrations, diagrams, and charts reflect unusual credit upon the author and publisher.

Progress in Surgery

A Résumé of Recent Literature.

Anatomic Relations of the Cavernous Sinus to Other Structures, with Consideration of Various Pathologic Processes by Which It May Become Involved. HENRY GLOVER LANGWORTHY, Dubuque, Iowa. *Annals of Otology, Rhinology and Laryngology,* September, 1916.

Langworthy describes the anatomy of the cavernous sinus and its relations to the neighboring structures and collects "the scattered data of pathologic affections available in the literature of the past fifteen years, together with information from question letters sent to prominent general surgeons throughout the country."

He has classified the pathological conditions affecting the sinus under the following heads: (1) septic thrombosis, (2) gun shot wounds, (3) involvement from fracture of the skull, (4) arteriovenous aneurism, (5) operative injury, (6) malignant growths, (7) congenital affections, (8) aseptic thrombus, (9) intermittent exophthalmos.

Septic thrombus is the most important of the conditions and the one most often encountered, tho its incidence is so rare that two or three cases is all that the average man will see in a lifetime. Its prognosis is bad. Altho in the more recent literature there are seven per cent of recoveries we can, in individual cases look only for an unfavorable outcome.

The author proposes an operation by the nasal route. The middle turbinate is removed and the ethmoid and sphenoid sinuses exenterated. The roof of the sphenoid is then broken thru and the opening enlarged by means of a currette of special construction. Then the sinus can be attacked. There is no danger to be feared from injury to the carotid.

An Epidemic of a Severe Form of Acute Infection of the Throat, with Abscess Formation—Report of Fifty-eight Operations. CLEMENT F. THEISEN, Albany, N. Y. *Annals of Otology, Rhinology and Laryngology,* September, 1916.

An epidemic of virulent, acute infection of the throat occurred in Albany and its environs; 384 cases were observed of which fifty-eight required surgical intervention. Forty-four were peritonsillar abscess, six bilateral; eight were abscess of the lateral columns of the pharynx and there were two each in the epiglottis, the lingual tonsils and retropharyngeal region. In these cases the tonsils appeared to be well.

Quoting Semon he states that all varieties of septic sore throat are essentially the same pathologically, differing only in the virulence of the infection. Cultures showed streptococcus as the infecting organism.

The patients were all very ill. The abscess cases started acutely and developed rapidly with adenitis and great edema extending in two cases into the larynx. Arthritis occurred in eight cases and endocarditis in one. Otitis was a frequent complication in cases both with and without abscess.

In some of the cases the upper poles of the tonsils were resected for drainage of the abscess and the author advocates tonsillectomy in the acute stage for the treatment of peritonsillar abscess in selected cases.

In thirty cases in which milk was examined the infection was traced to the same dairy. On the use of pasteurized milk the epidemic subsided.

Esophagotracheal Fistula. ROBERT LEVY, Denver. *Annals of Otology, Rhinology and Laryngology,* September, 1916.

Levy reports a case in a woman, aged 24, who had had asthma and bronchitis for a year. There was no history of syphilis. Wassermann test was not made. There was almost continuous cough and expectoration and a loss of weight amounting to thirty-five pounds.

Six days before examination there was difficulty in swallowing food. A diagnosis of laryngeal tuberculosis was made, but was not confirmed by examination. Violent coughing was induced by attempts at swallowing. An X-ray after a bismuth meal revealed a communication between the trachea and the esophagus. Death followed in twelve days.

Autopsy showed numerous scars on the tracheal mucous membrane and a perforation into the esophagus about two centimetres above the bifurcation. There was bronchopneumonia and several small pulmonary abscesses. Levy thinks that despite the absence of history syphilis was the underlying cause of the perforation.

Quoting the literature he finds that the chief causes of these perforations are, in their order of frequency, carcinoma, tuberculosis and syphilis. A few are traumatic due to the lodgment and ulceration of impacted foreign bodies and in some the cause cannot be determined.

The Diagnosis and Management of Vasomotor Disturbances of the Upper Air Passages. J. L. GOODALE, Boston. *Annals of Otology, Rhinology and Laryngology,* September, 1916.

The disturbances are dependent upon the entrance of foreign proteids into the system. This may be either by inhalation or by ingestion. Foreign proteids may develop upon the mucous membranes by autolysis of bacteria. In this connection the author points out the possibilities of chronic sinusitis and of chronic tonsillitis as factors.

Material for making skin reactions is prepared from the keratin and sera of domestic animals, from pollen and from various articles of food both raw and cooked.

The management of the cases depends upon the reactions in relation to the clinical history. Those due to pollen can be immunized by injections of pollen extract. Patients susceptible to proteids of animal origin should avoid the causes rather than seek immunization.

Disturbances of bacterial origin suggest the removal of foci that can cause the retention of bacterial products.

Adenoma of the Palate. GORDON B. NEW, Rochester, Minn. *Annals of Otology, Rhinology and Laryngology,* September, 1916.

Neoplasms of the palate are usually carcinomata. They arise either in the palate or extend from neighboring structures. Adenomata are very rare. Paget in 1886 reported thirty-one cases. Since that time New has been able to collect only eight cases with a pathological diagnosis and five reported as adenomata but without microscopicial diagnosis.

The age of the patients ranged from sixteen to sixty-five. There are no symptoms except those due to the size of the tumor. The tumors are encapsulated and covered by normal mucous membrane. They are embryonic in character. New reports two cases.

Report of the Removal of a Fragment of Tracheotomy Tube from the Lung, Six Years After its Inspiration. FRANCIS R. PACKARD, Philadelphia. *The Laryngoscope,* December, 1916.

Twelve years before Packard saw this patient he was in the Pennsylvania Hospital with an abductor paralysis for which he wore an intubation tube for two months. A month after his discharge from the hospital he returned with an attack of dyspepsia for the relief of which trachectomy was performed. He left the hospital six months later wearing the tracheotomy tube.

Six years ago he coughed out his tracheotomy tube, which he had not removed for any purpose during the three previous years, and found that a piece of it was missing. Since that time he has suffered from violent attacks of coughing, with pain in the chest and occasional bloody expectoration. In April, 1915, a roentgenogram revealed the presence of a foreign body in the right bronchus. He refused operation. In July, 1915, it was in the same position. Under ether anesthesia the piece of tracheotomy tube was extracted from the bronchus. The author notes that the man was wearing an obturator in his tracheotomy tube, but he refused to permit the closure of the tracheotomy wound. Despite the length of the residence of the foreign body in the bronchus the patient made a complete and uneventful recovery.